AMERICAN METEOROLOGICAL SOCIETY

R
016.5515
A512m

Illinois U Library

meteorological

abstracts and bibliography

Bibliography on Radar Meteorology, p. 680

. 2 August, 1951 No. 8

METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

Editor and Technical Supervisor: MALCOLM RIGBY

Corresponding Editor: DR. C. E. P. BROOKS

EDITORIAL STAFF

ISADORE L. DORDICK, *Analyst*
WILHELM NUPEN, *Analyst*
MARY L. RICE, *Assistant Editor-Bibliographer*
HARRIS P. KRAMER, *Bibliographer-Analyst*
WINIFRED SCHRAITLE, *Cataloguer*
DOROTHY M. GROPP, *Cataloguer*
KATHERINE MARTINOFF, *Technical Editor*

***EDITORIAL OFFICE:** Washington, D. C. **P.O. ADDRESS:** Box 1736, Washington 13, D. C. Telephone: REpublic 6278.

ADMINISTRATIVE OFFICE: American Meteorological Society, Office of Executive Secretary, 3 Joy Street, Boston 8, Mass.

*** Address all business communications, orders and inquiries to the Executive Secretary, Mr. Kenneth C. Spengler, 3 Joy Street, Boston 8, Mass. Exchanges and reprints may be sent direct to P. O. Box 1736, Washington 13, D. C.**

METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY is a monthly publication devoted to:

A. Current Abstracts in English on important meteorological literature in every language.

B. Bibliographic references to other items of interest to the profession.

C. Selective, annotated bibliographies on subjects of immediate and special interest to meteorologists.

SUBSCRIPTION RATE: $5.00 per year to members and non members. Single copies 75¢.

This publication has been made possible through support and sponsorship extended by the Geophysics Research Division of the Air Force Cambridge Research Center under Contract No. A. F. 19 (122) 82. It is published for technical information only and does not represent the recommendations or conclusions of the sponsoring agency.

METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

MALCOLM RIGBY, Editor

Vol. 2 AUGUST 1951 No. 8

AGRICULTURE · COMMERCE · AERIAL AND MARINE NAVIGATION · PUBLIC HEALTH · INDUSTRY · ENGINEERING
AMERICAN METEOROLOGICAL SOCIETY
1919

SPECIAL FEATURE IN THIS ISSUE

A Selective Annotated Bibliography on Radar Meteorology

(For complete table of contents see back cover)

Published monthly at Prince and Lemon Streets, Lancaster, Pa., by the AMERICAN METEOROLOGICAL SOCIETY, 3 Joy Street, Boston 8, Mass.

Printed and issued by: Lancaster Press, Inc.

FOREWORD

Meteorological Abstracts and Bibliography is a monthly publication whose purpose is to bring to the attention of meteorologists current literature in their field and in related fields and to provide bibliographic information on various subjects, as interest demands.

Part I contains from 100 to 200 abstracts of current periodical literature and monographs in the fields of meteorology, hydrology, oceanography, etc. These abstracts are arranged according to the Universal Decimal Classification.

Part II of each issue comprises a special annotated bibliography of from 50 to 250 important references on a special subject without respect to recency of material. No attempt is made to prepare exhaustive bibliographies; instead, the aim is to include a representative cross section of the various aspects of a subject. Preference is given to recent material, comprehensive works, material from obscure sources, and items with good bibliographies.

Vol. 1, No. 1–11, Jan.–Nov. 1950 carried the following bibliographies: *Atmospheric Pollution, Aerobiology, Cloud Physics and "Rainmaking," Hail, Tornadoes, Volcanic Dust, Climatic Changes, Thunderstorms, Icing, Acoustical Propagation* and *Evaporation.*

Bibliographies published this year were:

1. **Extended Forecasting,** Vol. 2, No. 1, Jan. 1951.
2. **Long Range Forecasting,** Vol. 2, No. 2, Feb. 1951.
3. **Soil Temperature,** Vol. 2, No. 3, March 1951.
4. **Constants, Units, Tables and Diagrams,** Vol. 2, No. 4, April 1951.
5. **Climate of the Near East,** Vol. 2, No. 5, May 1951.
6. **Climate of the Middle East,** Vol. 2, No. 6, June 1951.
7. **Special Winds,** Vol. 2, No. 7, July 1951.
8. **Radar Storm Detection,** Vol. 2, No. 8, Aug. 1951.

Forthcoming bibliographies will be:

9. **Condensation Trails,** Vol. 2, No. 9, Sept. 1951.
10. **Climate of Northeast Africa,** Vol. 2, No. 10, Oct. 1951.
11. **Mountain Meteorology,** Vol. 2, No. 11, Nov. 1951.

Other bibliographies in preparation are: *Carbon Dioxide in the Atmosphere, Climate and Cancer, Climate of Northwest Africa, Climate of South America: I. Río de la Plata Area, Dew, Machine Methods in Meteorology, Microwave Transmission, Objective Forecasting, Oceanographic Meteorology* and *Turbulence.*

Part III contains a listing of the contents of those journals which are primarily meteorological. These are published in the earliest issue where space permits.

Part IV is made up of author, subject and geographical indexes. In the June and December issues cumulative indexes are published.

EXPLANATIONS

Location of material: For each entry, a symbol is given for at least one library where th material may be found. The Union List of Serials (Gregory) is the source of most of th symbols used. In some cases, where no symbol has been assigned to a library, one will b devised according to the principles of the Union List.

Library symbols used in this issue may be found in the following list:

DA:	U. S. Dept. of Agriculture Library, Washington, D. C.
DBS:	U. S. Bureau of Standards Library, Washington, D. C.
DGS:	U. S. Geological Survey Library, Washington, D. C.
DLC:	Library of Congress, Washington, D. C.
DSI:	Smithsonian Institution Library, Washington, D. C.
DWB:	U. S. Weather Bureau Library, Washington, D. C.
MCM:	Massachusetts Institute of Technology, Cambridge, Mass.
MH-BH:	Harvard University, Blue Hill Observatory (and American Meteorologica Society) Library, Milton, Mass.

Other symbols:

*	before an entry indicates a good data source.
†	before an entry indicates a good bibliography.
§	before an entry indicates a synoptic case history study accompanied by charts

Geographic locations are in the English form rather than the form used locally, for example Moscow for Moskva.

Titles of articles or monographs are in the language of the original article unless otherwis stated. Slavic (Cyrillic) titles are transliterated into the Roman alphabet according to th Library of Congress transliteration scheme.

Abbreviations:

Titles of periodicals are not abbreviated, as a rule.

The months of the year from March to July are not abbreviated. Other months ar abbreviated as Jan., Feb., Aug., Sept., Oct., Nov., and Dec.

The word or abbreviation for Volume (Tom, Band, Jahrgang, Año, etc.), for Numbe (Heft, Fascicule, Vypusk, etc.) and for page or pages is omitted from most entries. Thus a entry will read as follows:

Meteorologische Rundschau, 2(5–6):146–151, May–June 1950.

This indicates that the article appeared in *Meteorologische Rundschau*, *Jahrgang* 2 (Vol 2), *Heft* 5–6 (No. 5 and 6), *pages* 146–151, May–June 1950.

PART I. ABSTRACTS OF CURRENT METEOROLOGICAL MATERIAL

GENERAL METEOROLOGY

2.8–1 551.5:06(43)

Aufbau und Aufgaben der Körperschaft des öffentlichen Rechts Deutscher Wetterdienst in der US-Zone mit Abkommen und Statut. [Organization and administration duties of the Deutscher Wetterdienst in the US-Zone, with directives and statutes.] *Germany, Deutscher Wetterdienst in der US-Zone, Mitteilungen*, No. 9, Jan. **1951.** 19 p. fold. chart and maps. **MH-BH**—Chart shows organization of service and map of US-Zone shows stations of various types which are set up under the directive, which is quoted in detail. The main types of stations are: synoptic, radiosonde, agro-meteorological, bioclimatic, research and climatic. The administrative, teletype, radio, climatological, forecast, instrument, research, library and publications branches are shown. *Subject Headings:* **Meteorological services, Germany.**—*M.R.*

2.8–2 551.5:06(54)

†India. Meteorological Dept., **Report on the administration of the Meteorological Department of the Government of India in 1945–1946.** Simla, Government of India Press, **1948.** 75 p. 18 figs., tables, 10 p. of biblio., append. **DWB**—A detailed report on the organization and activities of the various branches of the Meteorological Service of India during 1945–1946. The service for shipping, aviation, agriculture, hydrologic works, the military and other activities are given special emphasis. Telecommunications, weather control, regional organization, instrument and radiation research and publications by members of the staff all have a prominent place in this report. *Subject Headings:* **Meteorological services, India.**—*M.R.*

2.8–3 551.5:06(52)

Japan. Central Meteorological Observatory, **Report on the Japanese Weather Service.** Tokyo, March **1951.** 40 p. charts. In English. **DWB**—Includes chapters on history of Japanese Weather Service, organization (and the inevitable organization chart), list and chart of about 200 stations of various types in Japan, description of various services and their function; industrial meteorology, statistics, instruments, weather briefing service, research, library, publications (including period covered), forecast services of several types, communications, aerological, marine, magnetic, seismological observatories and work, and training school. *Subject Headings:* **Meteorological services, Japan.**—*M.R.*

2.8–4 551.5:06(09)(438)

Parczewski, Władysław, **Zarys historii Meteorologii w Polsce (od X do XIX wieku).** [Contribution to the history of meteorology in Poland (from X to XIX century).] *Przegląd Meteorologiczny i Hydrologiczny*, Warsaw, No. 1–4:79–95, **1949.** 31 refs. In Polish. **DWB**—The various climatic and meteorological studies carried out in Poland between 1815 and 1919, the organization of the Polish meteorological network and the role of Poland in the International Meteorological Organization are discussed. The names and dates of important Polish meteorologists and climatologists are given. *Subject Headings:* **General meteorology, Meteorological services, History of meteorology, Poland.**—*I.L.D.*

2.8–5 551.5:06(92)

§Schmidt, F. H. and Schregardus, M. W. F., **Iets over de weerdienst in Indonesië.** [Something about the weather service in Indonesia.] *Hemel en Dampkring*, 49(2):23–31, **1951.** 9 figs. *Ibid.*, 49(3):54–59, **1951.** 4 figs. **DLC**—The account begins with a brief summary of the synoptic organization and map of stations. The type of weather map met with is illus-

trated by 3 analyzed charts with fronts and by upper air temperature and dew point. Pt. 2 discusses causes of rainfall distribution (blocking by high ground and forced ascent; convergence and divergence, local and frontal). These are illustrated by two charts of monthly rainfall and one of fronts. Finally, Indonesian meteorology and aviation are briefly discussed. *Subject Headings:* **Meteorological services, Indonesia.**—*C.E.P.B.*

2.8–6 551.5:060

Berg, Hellmut, **Bericht über die Tagung der Deutschen Geophysikalischen Gesellschaft in Hamburg vom 23. bis 28.10.1950.** [Report on the meeting of the German Geophysical Society in Hamburg on October 23 to 28, 1950.] *Geofisica Pura e Applicata,* 19(1–2):100–104, Jan.–March 1951. **DLC**—Detailed report of papers and comments by various members attending. *Subject Headings:* **Geophysical conferences, Deutsche Geophysikalische Gesellschaft, Hamburg.**

2.8–7 551.5:060

Schneider-Carius, Karl, **Bericht über die Tagung der Meteorologischen Gesellschaft in Hamburg vom 25. bis 29.10.1950.** [Report on the meeting of the Meteorological Society in Hamburg on October 25 to 29, 1950.] *Geofisica Pura e Applicata,* 19(1–2):105–107, Jan.–March 1951. **DLC**—Tribute paid to ALFRED WEGENER, papers and comments by those attending (MÜGGE, FLOHN, RAETHJEN, SCHERHAG, SCHNEIDER-CARIUS, WICHMANN, KOSCHMIEDER, MÖLLER, HAUDE, STEINHAUSER and others from all the zones of Germany and Austria), reported in some detail. *Subject Headings:* **Meteorological conferences, Deutsche Geophysikalische Gesellschaft, Hamburg.**—*M.R.*

2.8–8 551.5:061.4:63

Market Produce Show, Southampton—June 30–July 1, 1950. *Meteorological Magazine,* London, 80(943):23–24, Jan. 1951. **DWB**—Description of Meteorological Office show tent and working display of effect of cloches on temperature. *Subject Headings:* **Meteorology, Agricultural exhibitions, Great Britain.**

2.8–9 551.5:539

Brann, H. N., **The weather man aids the physicist.** *Weather Development and Research Bulletin,* No. 16:54–55, Dec. 1950. **DWB**—Nuclear emulsion plates are being carried in radiosonde balloons to obtain records of cosmic ray collisions above 40,000 ft. To give best chance of recovery, this is done when forecasts indicate that instrument is likely to fall in a settled area. *Subject Headings:* **Applied meteorology, Atomic physics.**—*C.E.P.B.*

2.8–10 551.5:550.83

Glenn, Alfred H. and Bates, Charles C., **The meteorological and oceanographic aspects of geophysical prospecting.** *Geophysics,* Menasha, 15(2):247–256, April 1950. 2 figs., 2 tables, 12 refs. **DGS**—The authors discuss the relationship of the professional consulting meteorologist to the Weather Bureau and special applications of industrial climatology and of oceanography to off shore oil drilling operations. The application of short range forecasting and of punched card technique to forecasting weather and wave conditions required for special operations, for scheduling work areas, for planning exploration and for determining soil trafficability are considered. The importance and need for investigating microseisms, the dynamics of sedimentation with special reference to tides, wave refraction and current patterns are stressed. *Subject Headings:* **Industrial meteorology, Geophysical prospecting.**—*I.L.D.*

2.8–11 551.5:63:06

Tiscornia, José, **La meteorología agrícola debe interesar y pesar en las resoluciones de la IV Conferancia Interamericana de Agricultura.** [Agricultural meteorology should be of interest and figure in the resolutions of the IV Inter-American Conference on Agriculture.] *Revista Meteorológica,* Montevideo, 9(35):123–129, Oct. 1950. **DWB**—The author makes suggestions for including the IMO Agricultural Commission Resolutions in those of the Inter-American Conference on Agriculture. The resolutions drawn up at the Toronto meeting of the IMO (1947), which concern agricultural meteorology, are then given in Spanish and discussed

briefly. Notably the resolution on phenological lists, phenological stations, statistical studies of weather and crops, agro-meteorological networks, soil moisture measurements, agro-meteorological forecasts and training in colleges, are presented. *Subject Headings:* **Agricultural meteorology, IMO Resolutions.**—*M.R.*

2.8–12 551.5:631.4 551.5:626.8 551.586

Ogg, Sir William Gammie, **Weather and food.** Royal Meteorological Society, Centenary Proceedings 1950:239–243. **MH-BH**—A brief discussion of the effect of climate on the world distribution of soil types and of climate in agriculture (flooding, water supply, pattern of farming, plant diseases, livestock). *Subject Headings:* **Agricultural meteorology, Soil types, Irrigation and drainage.**

2.8–13 551.5:67

Put the weather to work for you. *Changing Times*, Washington, D. C., March 1951. p. 30–33. **DLC**—An account of how a business can save money by employing a consulting meteorologist to calculate probabilities of certain weather conditions from climatological data and their reactions on cost and yield. Several simple examples illustrating localization of a specific problem. *Subject Heading:* **Applied meteorology.**—*C.E.P.B.*

METEOROLOGICAL OBSERVATIONS AND INSTRUMENTS

OBSERVATIONS

2.8–14 551.501(02)

U. S. Weather Bureau, **Manual of surface observations. Circular N.** 6th ed. rev. June 1951. 123 p. 6 figs., 23 tables. **DWB**—From 1928 when the 1st edition of Circular N was issued by the U. S. Weather Bureau, through subsequent revision in 1932, 1935, 1939, 1941 and 1949, the book of instruction for observers grew and became so complicated that it was almost useless as a quick reference work for the observer when confronted with unusual conditions such as tornadoes, squalls, drifting snow or the like. The main use of the voluminous manual in recent years was to give the inspector a chance to "low-rate" the unwary observer who had not learned the instructions by rote. Now, however, the manual is much simplified and better organized, with major sections on observing, clouds, visibility, atmospheric phenomena, precipitation, temperature, humidity, pressure and wind. The manual is well indexed. *Subject Headings:* **Observers manuals, Surface observations.**—*M.R.*

2.8–15 551.501.9:551.584

Sapozhnikova, S. A., **Stantsiia po fizike prizemnogo vozdukha v Koltushakh i nekotorye vyvody iz ee nabliudenii.** [Station for research on physics of the air near the ground in Koltushe and some conclusions from its observations.] *Leningrad, Glavnaia Geofizicheskaia Observatoriia, Trudy*, 19(81):225–235, 1950. 6 figs., 3 tables, 19 refs. **DLC**—Measurements of effective radiation, temperature, humidity, cloudiness, radiative balance, evaporation, wind, soil temperature and moisture in the microclimatic layer, for the purpose of investigating effects of drought and of conservation measures, have been made by the Central Geophysical Observatory (Leningrad) on an experimental plot since 1948. Instruments used, especially for radiation, humidity, wind and soil temperature measurements, specification as to height above the soil or grass cover and depth below surface of measurements are described. Results of some wind profile, coefficient of turbulence, thermal conductivity of soil and heat balance calculations are shown in tables and graphs. *Subject Heading:* **Micrometeorological research.**—*M.R.*

2.8–16 551.506.7(52)

*Japan. Central Meteorological Observatory, **Aerological data of Japan during the international aerological days December 8th–17th, 1949.** Tokyo, March 1950. 45 p. numerous figs. and tables. In English. **DSI**—Radiosonde data for 10 stations ranging in latitude from Kagoshima (31°N) to Wakkanai (45°N). Pressure, temperature and humidity values are given for all significant levels as well as data for standard pressure surfaces, tropopause height,

etc. Highest point reached 26 km. (19 mb.) at Kagoshima. Wind aloft data given for 16 stations for same days. Vertical cross sections from Kadena to Nikolaevsk-on-Amur and synoptic charts for the 500 mb. level for 0300 and 1500 on each of the 10 days are presented. *Subject Headings:* **Upper air data, Japan.**—*M.R.*

2.8–17 551.506.9(41)

Britton, Charles E., **A chronology of British weather.** *Meteorological Magazine*, London, 79(941):329–330, Nov. **1950. MH-BH**—Description of a type-script chronology from Norman times to present, from chronicles, diaries and registers, compiled by the late R. W. JEFFERY and now in the Meteorological Office Library. *Subject Headings:* **Meteorological observations, Historical climates, British Isles.**

2.8–18 551.507.2

Frankcom, C. E. N., **The international operation of Ocean Weather Station "Mike."** *Marine Observer*, 21(151):23–25, Jan. **1951 DWB**—Description and photo of O.W.S. "Polarfront I" now maintained jointly by Norway, Sweden, Belgium and Denmark in 66°N., 2°E. *Subject Heading:* **Weather ships.**—*C.E.P.B.*

2.8–19 551.507.352

Shellard, H. E., **Simultaneous aircraft soundings of temperature and frost point.** *Meteorological Magazine*, London, 79(942):355–356, Dec. **1950.** 2 figs. **MH-BH**—Simultaneous temperature and frost point readings in two ascents of two aircraft flying in formation showed very good agreement. *Subject Headings:* **Airplane soundings, Instrumental errors.**

INSTRUMENTS

2.8–20 551.508:016

Blue Hill Meteorological Observatory, **Bibliography of meteorological instruments.** [Cambridge, Mass., Harvard University], **1950.** 165 leaves. (U. S. Weather Bureau Contract Owb 8120.) **DLC**—The catalog cards on meteorological instruments from the library of the Blue Hill Observatory were laid out 3 or 4 to a page, in the order in which they would appear in the U.D.C. scheme for meteorology, and reproduced. There are about 600 entries, some of which are annotated. No subject or author index is provided. *Subject Headings:* **Meteorological instruments, Bibliographies.**—*M.R.*

2.8–21 551.508.2

Georgi, Joh., **Messgerät der direkten Sonnenstrahlung für Expeditionen.** [Instrument for measuring direct solar radiation on expeditions.] *Polarforschung*, Band II, Jahrgang 20, No. 1–2:353–356, **1950. DWB**—Various types of solar radiation instruments are described and their virtues or deficiencies for field use are cited. The special meteorological equipment of all types, which was used on the Greenland Ice Cap by A. WEGENER during the 2nd International Polar Year (1932/3), is next listed and, finally, a special type of radiation meter, which has been used for more than 500 measurements (up to the summer of 1950), and its accuracy and calibration are described. *Subject Headings:* **Radiation meters, Radiation instruments.**—*M.R.*

2.8–22 551.508.21:551.521.63(471)

*Lunelund, Harald and Raunio, Niilo, **Strahlungsmessungen in Südfinnland mit dem bioklimatischen Ultraviolettdosimeter.** [Radiation measurements in southern Finland with the ultraviolet dosimeter.] *Societas Scientiarum Fennica, Commentationes Physico-Mathematicae*, Helsinki, 8(2), **1948.** 13 p. 6 figs., 6 tables, 11 refs. **DLC**—The solar spectrum, the operation of the UV dosimeter and UV intensities at Ilmala, Finland, on clear days and in the mean, are discussed and illustrated. Dependence of UV intensity on solar altitude in Finland was determined and is compared with similar determinations for Berlin and Arosa (Switzerland). *Subject Headings:* **Radiation measurements, Ultraviolet dosimeters, Southern Finland.**—*M.R.*

2.8–23 551.508.45

Jakov, Max and Spielman, Maurice, **Studies of accuracy attainable in the measurement of atmospheric pressure by means of hypsometers.** *Illinois Institute of Technology, Second Quarterly Progress Report*, October 1, 1950 to December 31, 1950. [n.d.] 13 leaves, 24 refs. Mimeographed. (Contract No. DA 36-039 sc-183.) **DWB**—Research conducted during the past months to determine the accuracy obtainable by using hypsometers to measure pressure in between 1050 and 550 mbs. and to design the most accurate possible type of hypsometer. Literature was thoroughly reviewed and the system used by MUELLER and STIGH selected for use. Properties of water at low pressure, temperature scales and resistance thermometers and pressure measurement control are investigated and discussed. *Subject Headings:* **Pressure measurements, Hypsometers.**—*M.R.*

2.8–24 551.508.58

Lamp, Reiner, **Erweiterte Anwendungsmöglichkeit der Wolkenzugsmessung durch Wolkenspiegel.** [Further possible application of measurement of cloud motion by cloud mirror.] *Meteorologische Rundschau*, 4(1–2):30, Jan.–Feb. **1951.** 2 figs. **MH-BH**—Describes a method of extending field of view of a reflecting nephoscope to 70° from zenith by projecting the reflected image on to a vertical glass plate. *Subject Heading:* **Nephoscopes.**—*C.E.P.B.*

2.8–25 551.508.7

Controlled humidity for research. *U. S. National Bureau of Standards, Technical News Bulletin*, 35(4):47–48, April **1951. DWB**—A recirculating apparatus for calibrating electric humidity elements of radiosondes has been devised by ARNOLD WEXLER and is described briefly and illustrated by a photograph and schematic diagram. See article by A. WEXLER, *U.S. National Bureau of Standards, Journal of Research*, 45(357), 1950 and 40, (479), 1948. Divided flow; low temperature humidity test apparatus. *Subject Heading:* **Humidity instruments.**—*M.R.*

2.8–26 551.508.71

Morrow, Martha G., **Humidity and weather.** *Science News Letter*, 58(25):394–395, Dec. 16, **1950.** 2 photos. **DLC**—How to make a "Santa Claus" hair hygrometer. Also reference to color changes of cobalt chloride with humidity. *Subject Heading:* **Hygrometers.**—*C.E.P.B.*

2.8–27 551.508.762:551.593.1

Kangieser, Paul C., **Refraction phenomena affecting ceilometer observations.** *Monthly Weather Review*, 78(12):211–216, Dec. **1950.** 6 figs., 6 refs., 2 equations. **DWB**—It was discovered that secondary reflections (spots or oscillations) were occurring too frequently at an angle of 48° elevation during ceiling height observations with the Weather Bureau ceilometer, when rain was falling. The theoretical optical solution presented here allows a "bright spot" between 47.9° and 49.8° elevation when a beam of red light shines upward through raindrops. Other features such as decrease of intensity of beam above 48° and "secondary" spots at 36° and near 0° are explained theoretically. Departures from the theory, methods of checking to ascertain if the spot at 48° is real or not and other practical matters are discussed. Schematic diagrams show optics of the problem. Actual ceilometer records during rain are reproduced. *Subject Headings:* **Ceilometer observations, Refraction phenomena, Rainbows.**—*M.R.*

2.8–28 551.508.762:629.13

Garbell, Maurice A., **Recent developments in visual low-approach and landing aids for aircraft.** *Garbell Research Foundation, Garbell Aeronautical Series*, San Francisco, No. 1, [1951]. 19 p. 2 figs., 11 refs. **DWB**—A section of this report (p. 16–19) deals with the development of automatic instrumentation for measuring and reporting ceiling, visibility and slant visibility for terminal airways, weather reports, especially for planes making visual low-approach landings. The brightness meter/transmissometer, located in the touchdown zone of the runway, gives much needed information. It has been tested experimentally during 1949–1950. A series of six vertical ceiling lights and one beam at a 45° angle is suggested for

more accurate instantaneous ceiling height measurements at night. Tests were made at Arcata. *Subject Headings:* **Aircraft landing aids, Ceiling projectors, Visibility meters.**—*M.R.*

2.8–29 551.508.77

Hauer, A., **A new recording rain gauge,** *Journal of Scientific Instruments*, 28(3):84–85, March **1951.** 2 figs., 2 refs. **DWB**—A simple automatic siphon recording rain gage is described and illustrated. After 10 mm. has been collected, a tilting mechanism empties the chamber in 4.5 sec. or less. No rainfall is lost in the process through dribbling. Evaporation is reduced to a minimum and the instrument is not easily gummed up with dirt or corrosion. *Subject Headings:* **Rain gages, Recording equipment.**—*M.R.*

2.8–30 551.508.77:551.557.35:551.553.5

Lacy, R. E., **Observations with a directional raingauge.** *Royal Meteorological Society, Quarterly Journal*, 77(332):282–292, April **1951.** 7 figs., table, 5 refs., 5 equations. **MH-BH**—Describes a gage with 8 vertical apertures 5×4 in. and a horizontal one also 20sq. in. Twelve years observations at Watford, near London, are summarized by seasons. Maximum catch from S.W., 35% (winter) to 18% (spring, summer) of horizontal catch. Mean angle of incidence varies from 30° from vertical in Jan. to 16° (summer), mean 22½. It varies with wind speed v (mi./hr.) as $\tan i = 0.44 + 0.140\ v$. Median drop diameter calculated as 1.2–1.4 mm. *Subject Headings:* **Rain gages, Wind effects, England.**—*C.E.P.B.*

2.8–31 551.508.822

Nyberg, Alf, **A comparison between the Väisälä radiosonde and the Friez radiosonde.** *Sweden, Meteorologiska och Hydrologiska Institut, Meddelanden, Ser. B*, No. 2, [**1946**]. 6 p. 5 tables, 4 refs. **MH-BH**—From check calibrations of 3 instruments and comparison on the same balloon train, U.S. Friez sonde averaged 2.5°C. lower than Väisälä, difference occasionally 10°C. It is concluded that the error is in the Friez sonde. *Subject Heading:* **Radiosondes.**—*C.E.P.B.*

2.8–32 551.508.822:551.510.52(99)

Viaut, André, Jalu, Raymond and Chabasseur, Robert, **Radiosondages dans l'Antarctique.** [Radiosondes in the Antarctic.] *Académie des Sciences, Paris, Comptes Rendus*, 229(24):1352–1353, Dec. 14, **1949.** table, 2 refs. **DLC**—During a cruise of the "Commandant Charcot" in the Antarctic in the summer of 1948–1949, 25 radiosonde ascents were made (19 reached the tropopause) between 137° and 161°E and 60° to 67°S. The temperature, pressure and height of the tropopause (ranging from 7000 to 9000 m.) is given for each ascent, along with the position and maximum height reached. The marked rise in temperature above the sharp tropopause and the structure of the troposphere is shown for one sounding in the vicinity of a cold front wave cyclone. *Subject Headings:* **Radiosonde ascents, Tropopause, Antarctic, "Commandant Charcot" cruise.**—*M.R.*

2.8–33 551.508.824

Sagara, D. and Tsukamoto, K., **Test of an automatic weather station, Part I and II.** *Journal of Meteorological Research*, Tokyo, 3(1):1–18, Dec. **1950.** 6 figs., tables. In Japanese, English summary p. (1). **MH-BH**—An automatic weather station on Mt. Tsukuba records pressure, temperature, humidity and wind direction and speed by land lines. Tests showed defects and methods were found for improvement. Wiring diagram given. *Subject Heading:* **Automatic weather stations.**—*C.E.P.B.*

2.8–34 551.508.92:551.591.1

Gavrilov, V. A., **Novyĭ pribor DM-7 dlia opredeleniia dal'nosti vidimosti ob'ektov i ogneĭ.** [New device DM-7 for determination of range of visibility of actual objects and lights.] *Leningrad, Glavnaia Geofizicheskaia Observatoriia, Trudy*, 19(81):66–78, **1950.** 4 figs., table, 21 equations. **DLC**—A new photometric device is described and illustrated and the theoretical considerations presented for determining contrast of objects, atmospheric transparency and actual meteorological visibility at dusk. History of the development of the method (since 1926) is given. *Subject Headings:* **Visibility meters, Atmospheric transparency, U.S.S.R.**—*M.R.*

SYNOPTIC ANALYSIS AND FORECASTING

2.8–35 551.509.3:551.511

§Charney, Jule G., Fjörtoft, R. and von Neumann, J., **Numerical integration of the barotropic vorticity equation.** *Tellus*, 2(4):237–254, Nov. **1950.** 7 figs., 7 refs., 41 equations. **MH-BH**—Making use of the high speed Eniac computing machine, the barotropic vorticity equation was integrated over a finite area of the earth's surface. Data was obtained from U. S. Weather Bureau 500 mb. analyses for North America and the North Atlantic region, and a series of 24-hour forecasts made and analyzed. Height changes at 500 mb. and 1000 mb. baroclinic tendencies were computed and found to agree with sea level tendencies. Errors were found arising from assumption that winds are parallel at all heights, and from use of an approximate difference equation. The possibility of reducing errors due to the effect of baroclinicity is examined. It was found that most troughs (16 out of 20) moved too slowly. It should be possible to make calculations for 24-hour forecast in 12 hours by this method. *Subject Headings:* **Vorticity, Mathematical forecasting.**—*M.R.*

2.8–36 551.509.31(269)

§Langford, J. C., **Southern ocean analysis—some aspects.** *Weather Development and Research Bulletin*, No. 16:5–31, Dec. **1950.** 8 figs., 3 plates, 8 refs. **DWB**—An independent analysis of charts of ocean to south and east of Australia April 20–27, 1949 shows some differences from technique of Australian Weather Bureau. The charts illustrate extension of fronts into low latitudes in S.W. Indian Ocean, cyclonic development S. of Heard Is., anticyclonic regime of eastern Indian Ocean, winter cyclones of W. Australia, penetration of Pm air into subtropics, cyclogenesis and frontogenesis. *Subject Headings:* **Fronts, Weather forecasting, Australia, Antarctic Seas.**—*C.E.P.B.*

2.8–37 551.509.33:517.512.2

Abbot, Charles Greeley, **Periodic influences on Washington and New York weather of 1949 and 1950.** *Smithsonian Miscellaneous Collections*, 111(17), March 22, **1950.** 8 p. 3 figs., 7 tables, 8 refs. **MH-BH**—Dates when rainfall in Washington was expected in 1949 were forecast from 27.0074 day cycle and verified. "Preferred" dates are given for all 1950. Dates of minimum temperatures in 1949 and 1950 are calculated from 6.6485 day cycle and results for 1949 analyzed for Washington and New York. *Subject Headings:* **Long range forecasting, Precipitation forecasting, Periodicities.**—*C.E.P.B.*

2.8–38 551.509.33

Abbot, Charles Greeley, **Precipitation and temperature in Washington, D. C., for 1950 and 1951.** *Smithsonian Miscellaneous Collections*, 116(4), March 1, **1951.** 6 p. 2 figs., 2 tables, 2 refs. **MH-BH**—Gives predicted dates in 1951 when precipitation at Washington is expected to be relatively heavy by 27 day cycle and predicted dates of minimum temperature by 6.6485 day cycle, with verifications of similar predictions for 1950. *Subject Headings:* **Long range forecasting, Weather cycles, Washington, D. C.**—*C.E.P.B.*

2.8–39 551.509.33:519.2

Baur, Franz, **Tatsachen zur Frage der Vorbereitung des mitteleuropäischen Winters.** [Facts on the question of the preparation for the central European winter.] *Annalen der Meteorologie*, 3(11–12):352–360, **1950.** fig., 5 tables, 10 refs. German and English summaries p. 352. **MH-BH**—Continues controversy with M. RODEWALD (*see item* No. 2.4–36 in April 1951 *Meteorological Abstracts*). RODEWALD's rule for forecasting from change of Siberian temperature Oct.–Nov. is based on only 4 cases. The value of Edinburgh as representing N.E. Atlantic is discussed and mean pressure changes Nov.–Dec. at 60°N., 20°W., Thorshavn and Aberdeen are compared with following winter temperature; correlation with temperature Jan.–Feb. is only −0.3. He confirms that mild Dec. 1–10 presages mild winter, and ends by justifying statistical forecasting. *Subject Headings:* **Long range forecasting, Central Europe.**—*C.E.P.B.*

2.8–40 551.509.33

Goldschmidt, H., **Die Singularitäten im jährlichen Witterungsverlauf von Wahnsdorf** [Singularities in the annual weather variations at Wahnsdorf.] *Germany, Meteorologischer Dienst der Deutschen Demokratischen Republik, Abhandlungen*, No. 2, **1950.** 48 p. 2 figs., 8 plates. **MH-BH**—The annual variation in daily mean values of all the weather elements observed at Wahnsdorf Observatory from 1927–1941 (25 years) is computed from hourly observations and significant anomalies discussed and explained. A calendar of singularities in pressure, cyclones, anticyclones, temperature (maximum, minimum and variability), moisture, sunshine, rainfall, wind speed and direction is included. *Subject Headings:* **Singularities, Annual variations, Wahnsdorf, Germany.**—*M.R.*

2.8–41 551.509.33:551.578

Schindler, Gerhard, **Weihnachten im Schnee?** [Christmas in snow?] *Kosmos*, 46(12):545–546, Dec. **1950.** 2 figs. **MH-BH**—In Germany it is an established fact that frost weather between Dec. 15 and 22 is usually followed by thaw weather on Christmas; if warm weather prevails between Dec. 15 and Christmas then cold weather occurs around New Year. The probability of occurrence of warm weather between Dec. 15 and Jan. 1 has been calculated on the basis of averages of thirty years' data. The variability of the weather between Christmas and New Year's day is attributed to interaction of warm and cold air masses and it is impossible to predict with any certainty which of the air masses will prevail. *Subject Headings:* **Long range forecasting, Snow forecasting, Germany.**—*I.L.D.*

2.8–42 551.509.33:551.590.21

Willett, Hurd C., **Extrapolation of sunspot-climate relationships.** *Journal of Meteorology*, 8(1):1–6, Feb. **1951.** table, 4 refs. **MH-BH**—Cyclical variations of sunspots and variations of temperature, precipitation, glaciers and non-outlet lakes during the past 200 years in the Northern Hemisphere have been analyzed and the characteristics of each of the factors have been arranged in temporal sequence in a table. Changes to cooler and wetter climate in middle latitudes, glacial advance in all regions of the Northern Hemisphere and rising levels of certain salt lakes occurred during the time of transition from the active to inactive sunspot cycles. The major warm, dry periods of glacial recession and the cold, wet periods of glacial advance have coincided generally with the longer periods of sunspot activity and inactivity respectively. The transition from warm dry to wet cool climatic conditions was more closely related to sunspot activity than the transition from cool wet to warm dry conditions in middle latitudes. Extrapolation of the data led to the following conclusions: the next sunspot maximum will occur in 1962; a continual and significant fall in temperature during the next 15 years; precipitation in latitudes below 50°N. will be considerably higher during the next 20 years; and the general recent recession of glaciers will be reversed during the next 20 years. *Subject Headings:* **Long range forecasting, Sunspots, Climatic variations.**—*I.L.D.*

2.8–43 551.509.67:551.508.85

Smith, E. J., **Observation of precipitation with an airborne radar.** *Australian Journal of Scientific Research, Ser. A, Physical Sciences*, 3(2):214–223, June **1950.** 14 figs., plate, 2 tables. 6 refs. **MH-BH**—Precipitation was induced artificially by seeding a cloud with dry ice. The precipitation was studied by means of a radar set, mounted in an aircraft, with beam directed downwards. The equipment and its installation are described and illustrated with photographs. The observed visual effects after seeding are given and the radar echoes are interpreted. Evidence is presented that the rain was formed from ice crystals produced by the seeding. *Subject Headings:* **Artificial precipitation, Radar observations.**—*I.L.D.*

STRUCTURE AND PHYSICS OF THE ATMOSPHERE

UPPER ATMOSPHERE—IONOSPHERE

2.8–44 551.510.42:67

McCabe, Louis C., **Atmospheric pollution.** *Industrial and Engineering Chemistry*, 42(7–10):73A–74A, 85A–86A, 123A–124A, 77A–78A, July–Oct. **1950.** 3 figs., photos, 24 refs. **DLC**—In the July issue the summaries and recommendations of three of seven panels of the

U. S. Technical Conference on Air Pollution (Washington, D. C., May 3–5, 1950) are given: Panels on Instrumentation, on Equipment and on Analytical Methods and Properties. In the August issue the reports of the other four Panels are given. In the September issue there is a brief account of the history of the work on distribution of atmospheric contaminants since 1918. A bibliography is appended. The October issue gives a description of the impinger method of stack sampling for dust analysis and of an adaptation of this method for collecting all mists and fumes, and of automatic and static pressure stack samples. Diagrams of the apparatus are given. *Subject Headings:* **Atmospheric pollution, Air Pollution Conference, Smoke abatement, Industrial meteorology, Stack affluents, Air sampling and analysis.**—*I. L. D.*

2.8–45 551.510.5 551.524.7:531.5

Berkes, Zoltán, **A nehézségi erötér szerepe a hömérséklet függélyes csökkenésében.** [The role of gravity in the vertical distribution of atmospheric temperature.] *Időjárás*, 54(3–4):80–87, March–April **1950.** 2 figs., 7 refs., equations. French summary p. 129–130. **MH-BH** —An attempt to explain theoretically the actual or known vertical distribution of temperature and density in the atmosphere up to 130 km. Reference is made to recent theories of Ackermann and Aujeszky. It is stated that the stratosphere is a result of the formation at a high level of a layer which is highly absorbent of solar radiation (ozonosphere), without which layer the temperature would continue to drop. *Subject Headings:* **Atmospheric structure, Upper air temperatures, Gravity effects.**—*M. R.*

2.8–46 551.510.5(43)

*Holzapfel, Rupert, **Der mittlere Zustand der freien Atmosphäre über Berlin und München.** [Average condition of the free atmosphere over Berlin and Munich.] *Germany, Deutscher Wetterdienst in der US-Zone, Mitteilungen*, No. 8, Jan. **1951.** 15 p. 12 tables, refs. **MH-BH** —Based on balloon soundings at Lindenberg (1906–35) and at Munich (1906–1928), and airplane soundings at Munich and Berlin (1936–1941), the mean absolute topography of the 500 mb. surface is computed for each month and adjusted values for the period 1901–1930 obtained by comparison of upper air means according to different authorities with surface norms at Berlin and Munich. From these values, the normal absolute topography at the standard isobaric levels up to 200 mb. and the temperature and pressure at the standard heights (to 11 km.) is given. The difference between free air temperatures and actual temperatures at Hohenspeissenberg and Zugspitze is also given. *Subject Headings:* **Atmospheric structure, Upper air temperatures, Mountain meteorology, Berlin, Munich, Germany.**—*M. R.*

2.8–47 551.510.535:551.594.7

Becker, Walter, **Über die Dämpfung der ausserordentlichen Komponente in der E1-Schicht der Ionosphäre.** [On the damping of the abnormal component in the E1 layer of the ionosphere.] *Journal of Atmospheric and Terrestrial Physics*, 1(2):73–81, **1950.** 6 figs., 4 refs., 2 equations. **MH-BH**—The experimental observation, that no extraordinary radio echoes can be received from the normal E layer around sunrise and sunset for frequencies from 1.39 to 2.5 Mc/sec., is shown to be in accordance with theory. Many experimental and theoretical curves are presented in support of this. *Subject Headings:* **Radio echoes, E1 layer.**—*From author's abstract.*

2.8–48 550.510.535

Berg, Hellmut, **Bemerkungen zur Meteorologie der Ionosphäre.** [Remarks on meteorology of the ionosphere.] *Geofisica Pura e Applicata*, 19(1–2):33–38, Jan.–March **1951.** 3 figs., table, 8 refs. German and English summaries p. 33. **DLC** —Daytime echoes from the ionosphere were observed on the 80 m. band during the fall of 1942 at Cologne. Between Aug. 14 and Oct. 14, 1688 disturbances of the E layer and 1977 disturbances of the F2 layer were observed with prevailing direction from the NE in the E layer (in the F2 layer no noticeable favored direction was found) and speeds ranging from 10 to 370 m./sec. for the E and F2 layers, respectively. Explanation of this movement is attempted, especially since it is not in agreement with movements observed at night by Hoffmeister ("Leuchtstreifen" at 120 km.), and are about 90° from direction of winds at 10 km. as observed from radiosonde ascents. *Subject Headings:* **Ionospheric drift, Winds in stratosphere, Cologne, Germany.**—*M. R.*

2.8–49 551.510.535

Gerson, N. C., **Continental sporadic E activity.** *American Geophysical Union, Transactions*, 32(1):26–30, Feb. **1951.** 8 figs., 2 refs. **MH-BH**—Numerous reports of abnormal radio propagation, due to reflections from a sporadic E layer, were received from ham radio operators all over the United States and are plotted on hourly charts for the period 2300 GMT June 17 to 0500, June 18, 1949. Movements of the *centers of mass* of the E_s layer are also shown on a composite map. One layer was in the southeast (moving west), one in the Montana area (moving south) and one in the Nevada area (moving west). *Subject Headings:* **Sporadic E layer, Ionospheric movements, Anomalous radio propagation, United States.**—*M.R.*

2.8–50 551.510.535

Kamiyama, Hiroshi, **Seasonal variation of the minimum frequency in h'-f curve for the "E" ionospheric region.** *Tohoku University, Science Reports, 5th Ser., Geophysics*, 2(2):79–85, Aug. **1950.** 5 figs., 4 tables, 10 refs., 17 equations. In English. **MH-BH**—The minimum critical frequency in the E layer at noon is found to be proportional to $\cos^{\frac{3}{4}}$ (zenith distance of sun at noon). This supports the existence of an ionized D layer about 55 km. and variations from the cos-law may give information about temperature in the middle stratosphere. *Subject Heading:* **E layer.**—*C.E.P.B.*

2.8–51 551.510.535

Nicolet, M., **Le problème des régions ionosphériques.** [The problems of ionospheric regions.] *Journal of Geophysical Research*, 54(4):373–381, Dec. **1949.** 5 refs., equations. English summary p. 373. **MH-BH**—The effect of radiations from different regions of the sun on dissociation of the components of the upper atmosphere and their rates of recombination at different heights above 85 km. are discussed. The E layer lies in the maximum concentration of O. Processes discussed or summarized in diagram-photodissociation of O_2, photo-ionization of N_2 and N, ionization of Na, H_2O and He. *Subject Headings:* **Ionosphere, Atmospheric structure.**—*C.E.P.B.*

2.8–52 551.510.535:621.396

Pfister, W., **Effect of the D-ionospheric layer on very low frequency radio waves.** *Journal of Geophysical Research*, 54(4):315–337, Dec. **1949.** 14 figs., 16 refs., 12 equations. Summary p. 315. **MH-BH**—The D layer is defined as a layer below E layer, at about 60 km., affecting propagation of long waves. Its probable electron and ion distribution is discussed, ion production is about 10/cm3/sec. Reflection and transmission coefficients are calculated. *Subject Headings:* **Ionosphere, Radio communication.**—*C.E.P.B.*

2.8–53 551.510.535:551.594.71

Schindelhauer, F. and Lauter, E. A., **Ein Beitrag zur Erforschung der Vorgänge bei Mögel-Dellinger-Effekten.** [A contribution to the observation of the processes in Mögel-Dellinger effects.] *Zeitschrift für Meteorologie*, 4(7–8):243–245, July–Aug. **1950.** 2 figs., 5 refs. **MH-BH**—On Sept. 13, 1949, 13.02 h., strong short wave fading at many stations coincided with a magnetic eruption effect. This was followed at 3-minute intervals by a weak increase in reception on 1250 m., increased disturbance on 2450 and 11,000 m. The frequency necessary to penetrate D layer at Dakar rose to 15.3 MHz. Other observations were made on June 28, 1949. Causes briefly discussed. *Subject Headings:* **D layer, Short wave radio transmission.**—*C.E.P.B.*

2.8–54 551.510.535

Stanley, J. P., **The absorption of long and very-long waves in the ionosphere.** *Journal of Atmospheric and Terrestrial Physics*, 1(2):65–72, **1950.** 4 figs., 9 refs. **MH-BH**—The Radio Research Group at Cavendish Laboratory made a detailed study of the variations in reflection of long and very long waves from the ionosphere during the daytime and at night. The experimental curves are presented and an attempt made to explain theoretically the variation from summer to winter and noon to night. Older linear or parabolic models of ionization density are abandoned in favor of one in which an absorbing layer of low ion density (D region) and of great thickness underlies the main reflecting region. The exponential model

is developed in detail and the sunset effect explained qualitatively. *Subject Headings:* **Long wave absorption, D layer, Ionospheric tides.**—*M.R.*

MECHANICS AND THERMODYNAMICS OF THE ATMOSPHERE

2.8–55 551.511

Giaõ, Antonio, **Sur les équations intégrales de l'hydrodynamique.** [On integral hydrodynamic equations.] *Journal de Physique et le Radium*, 11:219–226, **1950.** 4 refs., 42 equations. Reprint available. **MH-BH**—The author sets out a new way of handling the equations of hydrodynamics, which is free of the usual restrictions. It generalizes the methods of C. W. OSEEN (1927) and allows integral equations to be written for any type of movement and takes account of compressibility and variations of viscosity. The method is applied to special cases of perturbation. *Subject Headings:* **Dynamics of the atmosphere, Viscosity.** *-C.E.P.B.*

2.8–56 551.511

Scorer, R. S., **Atmospheric signal velocity.** *Journal of Meteorology*, 8(1):68–69, Feb. **1950.** 8 refs. Reply by J. G. Charney p. 69–70. **MH-BH**—The author criticizes the idea of a "signal velocity" proposed by J. CHARNEY (*ibid.*, 6:371, 1949) because he did not indicate the kind of disturbance that was propagated or how it arose. The role of gravity waves in the atmosphere is discussed. J. CHARNEY answers the criticism of Dr. SCORER by pointing out that he was not concerned with "gravity waves as synoptically significant phenomena but only with the formal properties of equations which permit their existence, i.e. the computational stability and boundary conditions." *Subject Headings:* **Gravity waves, Mechanics of the atmosphere.**—*I.L.D.*

2.8–57 551.511:551.513

Starr, Victor P., **Note on recent study of stability by R. Fjørtoft.** *Tellus*, 2(4):321–323, Nov. **1950.** 5 refs., equations. **MH-BH**—A method for investigating the dynamic stability of air currents was presented by FJØRTOFT (1950). The author attempts to show that the results of Fjørtoft could be expressed by a quasi-Lagrangian system of hydrodynamical equations as presented by STARR in the *Journal of Meteorology*, 2(4):227–237, 1945. He then goes through the same operations, using revised notations and equations. *Subject Headings:* **Dynamic stability, Zonal circulation.**—*M.R.*

2.8–58 551.511:551.501.7

Taylor, R. J., **"Evaluation geopotential of the pseudo adiabatic chart."** *Weather Development and Research Bulletin*, No. 16:37–40, Dec. **1950.** 2 figs. **DWB**—Introductory note by D. G. REID describes this as "an original and exact solution to the problem of energy evaluation on the pseudo-adiabatic diagram." For a sounding plotted on the Stüve diagram an auxiliary curve is drawn of potential temperature at 600 mb. against $p^{0.288}$. Area between this curve, two isobars and margin of chart is measured by "stretched thread" and directly converted to difference of geopotential. Error about 0.3%. *Subject Headings:* **Geopotential, Aerological diagrams.**—*C.E.P.B.*

2.8–59 551.511:523.2

Thomas, Richard N., **The thermodynamic structure of the outer solar atmosphere. I. The general method of analysis and preliminary results.** *Astrophysical Journal*, 111(1):165–172, Jan. **1950.** 2 tables, refs., 15 equations. **DLC**—A method for analyzing the thermodynamic structure of the outer solar atmosphere is presented. This method is based upon the observation that the kinetic temperature rises in the atmosphere so that self-absorption becomes important and that the anomalous part of the flash spectrum Balmer decrement is a measure of the hydrogen self-absorption in the solar atmosphere. The numerical amount of the anomaly is determined and is used to obtain the absolute number of atoms in the ground state of the Balmer series at each atmospheric height for which eclipse observations exist. These results are combined with the relative populations of the higher Balmer levels, obtained from emission lines corrected for the effect of self-absorption to derive numerical values of the kinetic temperature gradient and the electron density gradient. The preliminary

results give a kinetic temperature lying within 25 percent of the 35000°, determined from line contours in the same atmospheric level. *Subject Headings:* **Thermodynamics of the atmosphere, Solar atmosphere.**—*From author's summary.*

GENERAL CIRCULATION

2.8–60 551.513

Charney, Jule G., **On the scale of atmospheric motions.** *Geofysiske Publikasjoner*, 17(2), **1948.** 17 p. 16 refs., 74 equations. **DGS**—The author develops a theory of meteorological approximation using parameters for horizontal and vertical scales of motion, the speed of propagation of the streamline pattern, the horizontal particle speed and the interval static stability. The equations of motion are transformed so as to eliminate the horizontal divergence, and the geostrophic approximation is incorporated into the equations of motion. A dynamically consistent set of simplified equations of large scale motion, consisting of the conservation equations of potential temperature and absolute potential vorticity, and the hydrostatic and geostrophic equations are obtained. And it is shown that this simplified system filters out the meteorologically insignificant wave components from the wave equations for barotropic and baroclinic motion. The simplified equations facilitate numerical integration which presupposes only a knowledge of the initial pressure field so that the tendency equation can be used for prediction. *Subject Heading:* **Atmospheric motion.**—*I. L. D.*

2.8–61 551.513:525.35

Rudloff, Willy, **Zur jährlichen Schwankung der Erddrehung (Vorläufige Mitteilung).** [On the annual variation of the earth's rotation (advance communication).] *Annalen der Meteorologie*, 3(11–12):376–378, **1950.** table. **MH-BH**—From U. S. normal monthly pressure charts of the Northern Hemisphere author calculated the relative impulse and resulting change $\Delta\omega$ of angular velocity in each month. $10^9\Delta\omega/\omega$ varies from -21.9 in May to $+20.6$ in Sept. These values agree with observed variations. *Subject Headings:* **Rotation of the earth, General circulation.**—*C.E.P.B.*

2.8–62 551.513:525.35

Sutcliffe, R. C., **Variations in the length of the day.** *Meteorological Magazine*, London, 79(942):353–354, Dec. **1950. MH-BH**—Report of discussion at the Royal Astronomical Society on Nov. 24, 1950. Possible meteorological causes of minute, seasonal variation in length of day, are discussed. Dr. Sutcliffe estimated that surface pressure changes would give only 1% of required force, but effect of variations in wind would produce 25% of necessary effect. Dr. J. N. Carruthers discussed possible oceanographic effects following line of reasoning of Munk and Miller. *Subject Headings:* **Zonal circulation, Rotation of the earth.**—*M.R.*

2.8–63 551.513:525.35

van den Dungen, F. H., Cox, J. F. and Van Mieghem, Jacques, **Variations in the earth's angular velocity resulting from fluctuations in atmospheric and oceanic circulation.** *Tellus*, 2(4):319–320, Nov. **1950.** 10 refs., equation. Reply by W. H. Munk and R. L. Miller p. 320–321. **MH-BH**—A criticism of paper by Munk and Miller (*see item* No. 11–59 in Nov. 1950 *Meteorological Abstracts*) on the change in earth's rotation speed due to seasonal changes in general circulation. It is claimed that the annual variation of momentum transfer from earth to atmosphere is a better basis for calculating the annual variation of angular momentum, than the method used by Munk and Miller. Other objections relate to reduction of pressures to sea level and inaccurate data. Reply by Munk and Miller attempts to refute these objections. *Subject Headings:* **Zonal circulation, Rotation of the earth.**—*M.R.*

2.8–64 551.513:551.582

*§Rex, Daniel F., **Blocking action in the middle troposphere and its effect upon regional climate. II. The climatology of blocking action.** *Tellus*, 2(4):275–301, Nov. **1950.** 18 figs., 2 tables, 21 refs. **MH-BH**—This is a continuation of a study of the author which was abstracted in *Meteorological Abstracts* as No. 2.2–68 in Feb. 1951. In the present study 112 cases

of blocking action were investigated statistically and synoptically. Details of these cases are presented in a table. Persistence, movement characteristic and yearly variation (1933–1949) of frequency of blocking action are shown graphically. Mean surface pressure, temperature and rainfall charts are shown for a number of cases through June 1950. Effect on glaciation is explained; westerlies produce increase in glaciation, which is later retarded by blocking induced by glacial expanse. Atlantic blocks are more frequent than Pacific, and both tend to prevail for 12 to 16 days. *Subject Headings:* **Blocking action, Climatology, Glacial period, Europe.**—*M.R.*

2.8–65 551.513.1

†Palmén, Erik and Newton, C. W., **On the three-dimensional motions in an outbreak of polar air.** *Journal of Meteorology*, 8(1):25–39, Feb. **1951.** 10 figs., table, 26 refs., 15 equations. **MH-BH**—This paper is a synoptic investigation of the mechanism of three-dimensional air flow in a cold air mass of polar origin over North America during the period of April 3–7, 1950. The synoptic situation in the free atmosphere is analyzed and 500 mb. charts, isotherm charts at various isobaric surfaces and cross sections, and frontal contour charts are presented. The mean vertical velocities at different levels over the entire cold air region south of latitude 45°N. are computed by use of the principle of continuity of mass. The maximum mean subsidence is found to be nearly 2 km. per day at about the 600 mb. level. In addition, the distribution of vertical velocity in different parts of the cold tongue is computed by means of trajectories on isentropic surfaces, and some examples of characteristic three-dimensional air trajectories are given. The results show that a typical outbreak of cold air can be regarded as an effective cell for meridional exchange of mass, heat and angular momentum. *Subject Headings:* **General circulation, Dynamics of the atmosphere, Waves in the westerlies.**—*I.L.D.*

2.8–66 551.513.1

Wagemann, Hellmut, **Horizontale Schwingungen der Erdatmosphäre und die stationäre Luftdruckverteilung in gemässigten Breiten.** [Horizontal oscillations of the earth's atmosphere and the stationary pressure distribution in temperate latitudes.] *Annalen der Meteorologie*, 3(9–10):257–266, **1950.** 7 figs., table, 2 equations. English summary p. 265–266. **MH-BH**—The differential equations of an atmosphere circulating round the pole are set out. The solutions lead to real oscillations of synoptic importance. Amplitudes of about 60 oscillations of different types are calculated; they are only significant in mid-latitudes. The longer ones are often stationary, related to discrete values of the W–E circulation, but their location varies. Only a few oscillations can co-exist. Their distribution is related to configuration; this is illustrated by comparing the calculated and observed pressure distributions over the Atlantic. The difference summer–winter depends on the strength of the W–E circulation. *Subject Headings:* **Atmospheric circulation, Pressure circulation.**—*C.E.P.B.*

ATMOSPHERIC DISTURBANCES

2.8–67 551.515.11

Sutcliffe, R. C., **The quasi-geostrophic advective wave in a baroclinic zonal current.** *Royal Meteorological Society, Quarterly Journal*, 77(332):226–234, April **1951.** 6 equations. **MH-BH**—Studies characteristics of a wave disturbance in zonal flow, assuming horizontal isobaric motion, the thermal field being modified by advection only. The hydrostatic pressure changes set up instability; speed of unstable waves is $U - U_s/2$ where U is mean zonal wind and U_s Rossby westward component. Near stationary wave length field becomes stable (fig. 1). Theoretically the pressure and temperature waves may be antiphase, moving rapidly east with a strong surface pressure wave, or in phase, slow-moving and weak. *Subject Heading:* **Dynamics of the atmosphere.**—*C.E.P.B.*

2.8–68 551.515.2(759)

***Analysis of winds over Lake Okeechobee during tropical storm of August 26–27, 1949.** *U. S. Weather Bureau, Hydrometeorological Report* No. 26, Jan. **1951.** 80 p. 68 figs., map, table. **DWB**—A detailed study of the pressure and wind field during 1949 hurricane which passed directly over Lake Okeechobee. Individual large-scale maps are presented, showing

the hourly pressure distribution, and the wind speed isolines for each 10 minute interval from 8 P.M.–2 A.M., and for each hour from 1 P.M. on the 26th to 9 A.M. on the 27th. Highest sustained speeds were 85 m.p.h. over the lake. Lowest pressure 28.24 inches. Method of determining path of storm and effect of surface friction on wind direction and wind speed fields, described. Observations were made at 7 places on Lake Okeechobee. *Subject Headings:* **Hurricanes, Lake Okeechobee, Florida.**—*M.R.*

2.8–69 551.515.2

James, R. W., **On the evolution of tropical cyclones.** *Journal of Meteorology*, 8(1):17–24, Feb. **1951.** 5 figs., 9 refs., 8 equations. **MH-BH**—This article is a theoretical two-dimensional study of hurricane development by means of a simplified barotropic model of the hurricane vortex. Vortex formation is explained by the withdrawal of air from the center and the creation of the circulation mechanism of RAYLEIGH and BRUNT so that there is a steady change from anticyclonic to cyclonic absolute vorticity. The concept energy ratio $E = \frac{1}{2}p_1v^2/h$, which is a measure of particle stability or instability and hence of absolute vorticity, was applied to the study of 32 hurricanes in southeastern United States. Simple hurricane models were set up. On the basis of particular wind profiles their structure and development were studied and the energy ratio was compared with those of actual hurricanes. A constant E model approximated roughly an actual hurricane; its total kinetic energy increased a hundredfold with maturity and the greatest energy changes occurred during the mature stage of cyclonic vorticity. *Subject Headings:* **Tropical cyclones, Hurricane theory.**—*I. L.D.*

2.8–70 551.515.2(09)(729.5)

Salivia, Luis A., **Historia de los temporales de Puerto Rico.** [History of the (tropical) storms of Puerto Rico.] San Juan, Puerto Rico, Imprenta la Milagrosa, **1950.** Price $3.50. 393 p. chart, tables, biblio. p. 389–393. **DWB**—A description of each of 94 tropical hurricanes which affected Puerto Rico from Aug. 16, 1508 to Sept. 21, 1949. Most of the material was obtained from chronicles or newspaper reports, and although many years of work went into this voluminous publication, it is compiled from a popular rather than a meteorological point of view. Useful features are a listing by centuries, a 5-page bibliography, and a chart of the Caribbean showing trajectories of many tropical storms. *Subject Headings:* **Hurricanes, History of meteorology, Puerto Rico.**—*M.R.*

2.8–71 551.515.4 551.594.222 551.594.223

Neunteufl, Josef, **Wintergewitter, St. Elmsfeuer und Kugelblitz.** [Winter thunder, St. Elmo's fire and ball lightning.] *Wetter und Leben*, 3(3–4):49–57, March **1951. DWB**—Accounts of thunder Jan.–March 1949, remarkable occurrences of St. Elmo's Fire at Schafberg, June 1865 (7 ft. high!) and Sonnblick, Aug. 1889 etc., and descriptions of ball lightning with discussion. *Subject Headings:* **Thunderstorms in winter, St. Elmo's fire, Ball lightning, Sonnblick, Austria.**—*C.E.P.B.*

2.8–72 551.515.4(54)

Roy, A. K., **Air mass structure and the mechanism of thunderstorms in India during the pre-monsoon and post-monsoon seasons.** *India, National Institute of Sciences, Proceedings*, 15(7):289–300, Sept.–Oct. **1949.** 6 figs., 5 refs. **DBS, DLC**—In India well developed thunderstorms occur as a rule only in April and May and from mid Sept. to mid Nov., respectively. The aerological and air mass conditions, giving rise to such thunderstorm activity, and the regions most affected are analyzed and discussed. Synoptic conditions on occasions favorable for thunderstorm are also discussed and the air flow illustrated by stream line charts. Differences between pre-monsoon and post-monsoon conditions slight. *Subject Headings:* **Thunderstorms, Air masses, India.**—*M.R.*

2.8–73 551.515.71:551.510.53

†§Reineke, Ingrid, **Untersuchungen über die Abweichungen vom Gradientwind in der oberen Troposphäre.** [Investigation of deviations from gradient wind in the upper troposphere.] *Berlin, Freie Universität, Institut für Meteorologie und Geophysik, Meteorologische Abhandlungen*, 1(1), **1950.** 119 p. 33 figs., 18 tables, 54 refs., 3 equations. German summary

p. 112–113. **DWB**—A dynamic-statistical-synoptic-aerological dissertation based on SCHERHAG's theory that departures from the gradient wind give rise to the formation of anticyclones. After a brief discussion of classic works on the dynamic causes of pressure changes, a statistical analysis is made of upper wind data for Western Europe, showing that average departures from geostrophic winds are 2° toward the high pressure whereas a 1° departure would compensate for all motion toward the cyclone. After the dynamics and theory are discussed at length, 3 synoptic examples are presented in great detail with carefully analyzed surface, upper air and isallobaric charts. *Subject Headings:* **Anticyclogenesis, Pressure changes, Gradient winds, Synoptic aerological studies, Western Europe.**—*M.R.*

2.8–74 551.515.8(54)

Roy, A. K., **Study of air mass characteristics over India and use of upper air data.** *India, National Institute of Sciences, Proceedings*, 15(7):301–305, Sept.–Oct. **1949. DBS, DLC**—A brief note giving in condensed form the characteristics of the air masses in various parts of India which fall under the two main types: 1) the northeast or dry monsoon of winter, and 2) the southwest or wet monsoon of summer. These several types of air mass are compared with other masses of Asia on a Rossby type diagram (θ_s, w). For instance, Agra in winter is compared with Moscow and Bangalore with Hongkong. Climatological features associated with these air masses are discussed. *Subject Headings:* **Air masses, India.**—*M.R.*

2.8–75 551.515.811

§Lamb, H. H., **Essay on frontogenesis and frontolysis.** *Meteorological Magazine*, London, 80(944):35–46, Feb. **1951.** 8 figs., 7 refs. **DWB**—In a deformation field (col) steep thermal gradients develop parallel to isotherms and weak gradients across them, strengthening existing weak fronts and forming jets. Regions where surface gradient is normally strong thus favor frontogenesis, but this alone rarely forms actual fronts. The most prolific source of secondary cold fronts is the pseudo-warm sector of a bent-back occlusion. Example analyzed Feb. 22–23, 1946. Squeezing together and energizing parallel fronts is illustrated on June 19, 1945. Other types of frontogenesis briefly mentioned. *Subject Headings:* **Frontogenesis, Frontolysis.** —*C.E.P.B.*

RADIATION AND TEMPERATURE

RADIATION

2.8–76 551.521:523.3

Lettau, Heinz, **On the heat budget of the moon and the surface temperature variation during a lunar eclipse.** *Geofisica Pura e Applicata*, 19(1–2):1–18, Jan.–March **1951.** 3 figs., 4 tables, 9 refs., 42 equations. English summary p. 1. **DLC**—In order to determine the micro-meteorological conditions of temperature and radiative balance on the surface of the moon, the author develops three theoretical models based on the assumption that the surface material on the moon is homogeneous but in the *first* case there is no variation of thermal properties with depth, in the *second* the variation is linear with depth and in the *third* case varies only with time. The results of the theoretical models are tested against data obtained by PETTIT (1940) during the lunar eclipse of Oct. 27, 1939 and it is found that the best fit is obtained by assuming that the surface of the moon is covered with some highly porous material such as volcanic ash from .2 to 1.0 thick, or rock .5 m. thick. During totality conditions approximate those which would occur with the second model. PIDDINGTON and MINNET (1949) estimated that there was a dust layer .4 m. thick, by studying microwave thermal properties of the moon. *Subject Headings:* **Energy exchange, Moon.**—*M.R.*

2.8–77 551.521.1:517.512.2

Abbot, Charles Greeley, **Progress of research on solar and terrestrial relations.** *Commission pour l'Étude des Relations entre les Phénomènes Solaires et Terrestres, Sixième rapport*, Orléans, France, p. 55–57, **1948.** 5 refs. **MH-BH**—Brief review of activities of Smithsonian Astrophysical Observatory and effect of solar periodicity of 6.6456 days on temperature. *Subject Headings:* **Solar radiation, Periodicities.**

2.8–78 551.521.1(774)

†*Crabb, George A., Jr., **Solar radiation investigations in Michigan.** *Michigan State College, Agricultural Experiment Station, Technical Bulletin* 222, Oct. **1950.** 153 p. 49 figs., 10 tables, biblio. p. 76–153. **DWB**—Daily and hourly records of total solar and sky radiation received on a horizontal surface at East Lansing, Michigan, over a period extending from Jan. to Dec. 31, 1947 are presented in tabular form. The daily totals of solar and sky radiation for the period 1943–1947 together with a "smooth" curve of these data are presented graphically. The smooth curve was obtained by using a 15-day moving average of the daily values of total radiation and averaging arithmetically each value of the moving average of the daily values with the moving values of corresponding days for each of the other years. The solar and sky radiation received annually at the outer limits of the atmosphere is compared with the probable maximum and normal radiation received at East Lansing. The annual pattern of radiation, represented by a smoothed curve is compared with that of 35 cities in the United States, Puerto Rico and Hawaii. The discussion of the data is brief and purely qualitative. An extensive bibliography on solar radiation is given. *Subject Headings:* **Solar radiation, Sky radiation, East Lansing, Michigan.**—*I.L.D.*

2.8–79 551.521.31:551.576

Thams, J. Chr., **La radiazione globale relativa secondo le diverse specie di nebulosita.** [Relative global radiation according to various kinds of cloudiness.] *Geofisica Pura e Applicata,* 14(3–4):163–172, April–June **1949.** 2 figs., 3 tables, 12 refs. English, French and German summaries p. 163–164. **DWB**—Total sun and sky radiation on a horizontal surface, measured with a bimetallic Fuess-Robitzsch actinograph at Locarno-Monti are compared with amount of high, medium and low cloud, total nebulosity and duration of sunshine. High clouds have practically no effect, 10/10 medium and high cloud cuts off 60% and 10/10 low cloud 80% clear sky radiation. Data for Zurich given for comparison. *Subject Headings:* **Solar radiation, Cloudiness.**—*C.E.P.B.*

2.8–80 551.521.4 551.594.51

Pearse, R. W. B., **The spectrum of the night sky.** *Commission pour l'Étude des Relations entre les Phénomènes Solaires et Terrestres, Sixième rapport,* Orléans, France, p. 180–184, **1948.** tables, 6 refs. **MH-BH**—Comparison of spectra of night sky and aurora and list of strong ultraviolet bands of the night sky with their molecular identification. *Subject Headings:* **Night sky spectra, Auroral spectra.**

2.8–81 551.521.4

Simamura, H. and Ichimura, I., **On the intensities and altitudes of the night-sky light.** *Papers in Meteorology and Geophysics,* Tokyo, 1(1):153–160, Oct. **1950.** 5 figs., 6 refs., equations. In English. **MH-BH**—Author calculates formulas for intensity of incident nocturnal illumination from a cone of the sky, the correction for refraction and the scattered light. The observed intensity should be the sum of these. Ratio of observed intensities at zenith distances 54° and 0° gave inconsistent results by these formulas. Rather obscure. *Subject Heading:* **Light of the night sky.**—*C.E.P.B.*

2.8–82 551.521.7

Wild, J. P. and McCready, L. L., **Observations of the spectrum of high-intensity solar radiation at metre wavelengths. I. The apparatus and spectral types of solar burst observed.** *Australian Journal of Scientific Research, Ser. A, Physical Sciences,* 3(3):387–398, Sept. **1950.** 3 figs., 2 plates (one fold.), table, 7 refs., 6 equations, append. **DWB**—The authors describe the apparatus and method for recording the spectrum of the high intensity radio frequency radiation emitted by the sun in the frequency range 70–130 Mc/s. Results indicating the different kinds of spectra in solar bursts and the relationship of these bursts to those observed by means of single-frequency equipment are discussed. A special discussion on the effective area and design of the rhombic aerial, which is used to receive the radiation, is appended. *Subject Heading:* **Solar radiation, Corpuscular radiation.**—*I.L.D.*

2.8–83 551.521.7

Wild, J. P., **Observations of the spectrum of high-intensity solar radiation at metre wavelengths. II. Outbursts.** *Australian Journal of Scientific Research, Ser. A, Physical Sciences*, 3(3):399–408, Sept. **1950.** 2 figs., 2 fold. plates, 2 tables, 18 refs., equations. **DWB**—The author describes observations of the spectrum of solar radio frequency radiation in the frequency range 70–130 Mc/s. The apparatus and method of recording the spectrum is described in article by WILD and MCCREADY (*see item* 2.8–82). The correlation of outbursts and other solar radio-frequency emissions with solar flares and magnetic storm is discussed. The spectra are interpreted as the result of "surge" prominences in the solar atmosphere and the factor causing the surge phenomenon corresponds to the particles that bring about terrestrial magnetic storms. *Subject Heading:* **Solar radiation, Corpuscular radiation.**—*I. L. D.*

TEMPERATURE

2.8–84 551.524(494.1)

Ekhart, E., **Das Temperaturfeld der Alpen und seine Jahresperiode.** [Temperature field of the Alps and its yearly variation.] *Geografiska Annaler*, 32(1–2):1–20, **1950.** 5 figs., 6 maps, 11 refs. **MH-BH**—Based on 50 years of continuous records (1881–1930) of temperature for 1000 stations between sea level and 3300 m. in the French, Swiss, German and Austrian Alps, monthly averages, amplitude and phase of annual temperature cycle, and duration of vegetation period ($\geqslant 5°$C.) are computed, presented in tables and in charts and discussed. Sources are given, station location chart presented and methods of statistical analysis, correlation and computation of anomalies fully treated. Effects of elevation above sea level on temperature, phase, etc. are integrated and shown graphically for the entire area as well as regionally by means of carefully drawn local isanomaly charts. *Subject Headings:* **Temperature, Mountain meteorology, Alps.**—*M.R.*

2.8–85 551.524:551.584:63

*Mäde, Alfred, **Widerstandselektrische Temperaturbeobachtungen an einer mikroklimatischen Basisstation.** [Temperature measurements made with an electric resistance thermometer at a microclimatic station.] *Germany, Reichsamt für Wetterdienst, Wissenschaftliche Abhandlungen*, 5(3), **1938.** 42 p. 18 figs., 22 tables. **DLC**—This is a study of the march of temperature at 2, 5, 10, 20, 30 and 50 cm. above the ground, made with a point recording electric resistance thermometer. The problem of the use of point recording data is discussed. It was found that means, calculated from extremes of ten minute records, approximate closely means based upon 60-minute records, since the difference between the two differently derived means is not significant statistically. The march of temperature over a snow field during a winter night with strong outgoing radiation was investigated. From the distribution of temperature about the mean and the coefficient of vertical "austausch" it is concluded that very low temperature above a snow cover result from intense outward radiation. The author also investigated the march of temperature in the atmospheric layer adjacent to the ground during a summer day with strong incoming solar radiation. A comparison was made between temperature observations over an uncultivated field with those made in a topinambur stand. *Subject Headings:* **Temperature measurements, Microclimatology, Agricultural climatology.**—*I. L. D.*

2.8–86 551.524:523.8

Underhill, Anne B., **A high-temperature model atmosphere.** *Astrophysical Journal*, 111(1):203–206, Jan. **1950.** 3 tables, 10 refs., 2 equations. **DLC**—The method of model atmospheres is applied to the determination of the temperature of an early-type atmosphere. For a model, characterized by a given temperature and surface gravity, a structure in mechanical equilibrium is obtained by integrating the differential equation of mechanical equilibrium. The net flux in this atmosphere is calculated at several optical depths by a method of representative points and weights developed by STRÖMGREN. A real stellar atmosphere is obtained in radiative equilibrium as the calculated flux is constant with depth, and the effective temperature of the stellar atmosphere, *Te*, is 36,800°. The spectral type of the model atmosphere is determined by calculating the relative intensities of the line pairs CII λ4267/CIII λ4187 and

SiIII4820/SiIV λ4089 and compared with the line intensities for carbon and silicon obtained by UNSÖLD for τ Sco. It is concluded that the spectral type of the model atmosphere is 09.5V. *Subject Headings:* **Stellar atmospheres, Atmospheric temperature.**—*I.L.D.*

2.8–87 551.524.3:551.578.46

Tollner, Hanns, **Bericht über den Zustand einiger Tauerngletscher am Ende des Sommers 1950.** [Report on the state of some Tauer glaciers at the end of the summer of 1950.] *Wetter und Leben*, 3(3–4):47–49, March **1951. DWB**—The warm dry summer of 1950 followed a snowy winter and spring. Firn about 4 m. thick rose from 2500 m. in mid-March to 3000 m. at beginning of June. This was followed by rapid melting of new firn; thickness of glaciers decreased. *Subject Headings:* **Temperature variations, Snow cover, Glaciers.**—*C.E.P.B.*

2.8–88 551.524.36:632

Smith, L. P., **Temperatures under dutch lights.** *Meteorological Magazine*, London, 80(944):50–52, Feb. **1951.** 5 tables. **DWB**—Shielded distant-reading thermographs were installed 4–5 inches above ground in two cold frames and in open. The minima were higher in the 2-light than in the 5-light frame by 0.6°F. (Feb.) to 3.9° (June); both were 3–5°F. higher than in the open, the difference increasing with the preceding day's sunshine. Difference between maxima in frames and open is given by $D=0.2\ n+2.5\ h$; n=number of days after Jan. 31, h total sunshine in hours up to 13 h. *Subject Headings:* **Temperature variations, Agricultural meteorology.**—*C.E.P.B.*

2.8–89 551.524.7:551.510.53

*Wexler, Harry, **Annual and diurnal temperature variations in the upper atmosphere.** *Tellus*, 2(4):262–274, Nov. **1950.** 7 figs., 2 tables, 23 refs., 10 equations. **MH-BH**—An attempt is made to determine the annual and diurnal variations of temperature to a height of 80 km. by knitting together available observations and theoretical results. The observations include radiosonde data, meteor-determined densities, V-2 rocket observations, anomalous propagation of sound, and infrared spectroscopy. The theory most heavily relied upon is the radiative computation made by GOWAN. For the annual temperature range there is reasonably good agreement between theory and observations, such that in the upper ozonosphere (30 to 55 km.), summer temperatures are higher than winter temperatures by amounts as large or larger than those at the surface. As in lower levels, the annual temperature range aloft increases with latitude. For the diurnal temperature variations there is a large disagreement between the computations of GOWAN and PENNDORF. However, available evidence appears to favor GOWAN's computations, which, together with other considerations, indicate a diurnal temperature range of the order of 10 to 15°C. *Subject Headings:* **Annual temperature variations, Diurnal temperature variations, Upper air temperatures.**—*Author's abstract.*

ATMOSPHERIC PRESSURE AND WIND

PRESSURE

2.8–90 551.54

Shuman, Frederick G., **Solutions of a differential equation of pressure tendency.** In: Research on atmospheric pressure changes. *Massachusetts Institute of Technology, Dept. of Meteorology, Technical Report* No. 9, April 15, **1951.** 134 p. 36 figs., 3 tables, refs. p. 132–134, 38 equations. **DWB**—The author derives a differential equation of pressure tendency and solves it for two simple sinusoidal models of atmospheric dimensions. An isentropic coordinate system is used. The differential equation of pressure tendency and its boundary conditions are transformed into finite differences form. It is concluded that the mechanism of pressure tendency, represented by the differential equation, explains quantitatively the general features of the fields of pressure tendency, divergence and vertical velocity about typical atmospheric pressure systems. *Subject Heading:* **Pressure changes.**—*I.L.D.*

2.8–91 551.547.1

Lönnqvist, Olov, **Förenkling av höjduträkningen vid radiosondering.** [A new method for simplifying aerological height computation.] *Sweden, Meteorologiska och Hydrologiska*

Institut, Meddelanden, Ser. B, No. 4, **1947.** 11 p. 2 figs., tables, 10 equations. English summary p. 8–9. **MH-BH**—Pt. I describes a slide-rule method for determining the virtual temperature of a column of air. Pt. II gives a simplified method of calculating height from an aerological ascent by $H=14.35(T_{v1}+T_{v2})(\log_e p_1-\log_e p_2)$ where T_{v1}, T_{v2} are virtual temperatures at pressures p_1, p_2. A table gives 14350 $(\log_e o-\log_e p_o)$ for various values of p, p_o. *Subject Headings:* **Upper air computation, Height computation.**—*C.E.P.B.*

WIND EFFECTS

2.8–92 551.556:551.465

Carruthers, J. N., Lawford, A. L. and Veley, V. F. C., **Continuous observations from anchored vessels on water movements in the open sea. Experiences at the "Royal Sovereign" (50°43′N, 0°27′E) and "Cromer Knoll" (53°16′N, 1°18′E) light vessels.** *Deutsche Hydrographische Zeitschrift*, 3(5–6):277–286, **1950.** 7 figs., 2 plates, table. English and German summaries p. 277. **DWB**—The resultant water movements are analyzed and compared with the resultant wind movements. The means are: "Royal Sovereign," water 6.5 mi./day, from S38E, wind 0.8 mi./hr. from S56W; "Cromer Knoll," water 0.4 mi./day from S29E, wind 1.5 mi./hr. from N5W. A curve extends THORADE's equation connecting wind V and water travel by adding a term $.011\times10^{-3}$ V^2 for winds above force 6. *Subject Headings:* **Wind effects, Oceanography.**—*C.E.P.B.*

2.8–93 551.556:551.465(484.9)

Carruthers, J. N., Lawford, A. L. and Veley, V. F. C., **Water movements at the North Goodwin Light Vessel.** *Marine Observer*, 21(151):36–46, Jan. **1951.** 5 figs., table, 4 refs. Summary p. 45–46. **DWB**—Describes and illustrates observations with a cup measuring unit and a direction-viewing unit in 51°20.3′N., 1° 34.5′E., Dec. 1939–Aug. 1940. Water moved SW and NE, average speed 28 miles/day, the mean residual current being 2.5 miles/day to SW. Results agreed with THORADE's formula $V_w=.0126V/\sqrt{\sin\lambda}$ where V_w, V are water and air speeds and λ is latitude. The circulation in the southern North Sea is tentatively reconstructed, but the local wind appears to have a dominating and immediate effect on the residual water movement. *Subject Headings:* **Wind effects, Oceanography, North Sea.**—*C.E.P.B.*

2.8–94 551.556:551.465

Dietz, Robert S. and LaFond, Eugene C., **Natural slicks on the ocean.** *Journal of Marine Research*, 9(2):69–76, Oct. 1, **1950.** 4 photos, 7 refs. **NH-BH**—Slicks are attributed to small wind-induced convergences in sea surface caused by winds of about 2 m.p.h. *Subject Headings:* **Wind effects, Slicks.**—*C.E.P.B.*

2.8–95 551.556:551.465

Hidaka, Koji, **Lateral mixing and wind-driven currents in an enclosed ocean.** *Journal of Marine Research*, 9(2):55–64, Oct. 1, **1950.** 4 figs., table, 5 refs., 17 equations. **MH-BH**—Mass transport, taking account of lateral mixing, is calculated for a rectangle comparable to North Pacific, with anticyclonic circulation, by integrating downwards along x and y axes. Result shows two main circulations, clockwise in west, anticlockwise in east, the former increasing at the expense of latter as lateral mixing increases. The effect is as if prevailing winds produce a similar oceanic circulation displaced considerably to west. There are indications also of anticlockwise gyrals to north and south, suggesting Oyashio and Equatorial Counter Current. *Subject Headings:* **Wind waves, Ocean currents.**—*C.E.P.B.*

2.8–96 551.556:551.46

Mason, Martin A., **The wind element in beach erosion.** *U. S. Army Corps of Engineers, Beach Erosion Board, Bulletin*, 4(3):19–23, July 1, **1950.** 3 refs. **DGS**—Wind is the source of energy which produces beach erosion. The direct effect of wind, while not as obvious as that of wind waves in transporting sand along a beach, is very important. Mechanism and results of transport of sand by wind and water are discussed theoretically and examples cited. *Subject Headings:* **Wind effects, Beach erosion.**—*M.R.*

2.8–97 551.556

Stommel, Henry, **Streaks on natural water surfaces.** *Weather*, 6(3):72–74, March **1951.** 2 plates, 12 refs. **DWB**—Describes different types of streaks, single (often shear lines possibly due to subsidence) and multiple parallel or venous, generally aligned up or down wind. Various explanations are reviewed. Cinematograph studies show surface convection. *Subject Headings:* **Wind effects, Wind streaks.**—*C.E.P.B.*

2.8–98 551.556:551.46:532.593(794)

Wiegel, Robert L. and Kimberley, H. L., **Southern swell observed at Oceanside, California.** *American Geophysical Union, Transactions*, 31(5), Pt. 1:717–722, Oct. **1950.** 4 figs., table, 9 refs. **MH-BH**—Swell from S–SW on California coast, period 12–18 sec., up to heights of 8 ft. was traced to area 40–65°S, 120–160°W. This is a place of maximum gale frequency in southern winter. *Subject Headings:* **Ocean wave measurement, Oceanside, California.**—*C.E.P.B.*

2.8–99 551.556:551.465

Woodcock, Alfred H., **Subsurface pelagic "Sargassum."** *Journal of Marine Research*, 9(2):77–92, Oct. 1, **1950.** 7 figs., table, 13 refs., 2 equations. **MH-BH**—Observations of *Sargassum* in N. Atlantic at and below surface, plotted against wind speed and vapor pressure gradient 0–3 meters over sea show a tendency for plants to submerge with higher wind speeds (above 4 m./sec.) and to a less extent with higher v.p. gradient. This is explained by a wind driven circulation of surface waters in vertical cells. *Subject Headings:* **Wind effects, Oceanography, Marine algae.**—*C.E.P.B.*

AQUEOUS VAPOR AND HYDROMETEORS

WATER VAPOR AND CLOUDS

2.8–100 551.57:551.510.53

*Barrett, Earl W., Herndon, Lee R., Jr. and Carter, Howard J., **Some measurements of the distribution of water vapor in the stratosphere.** *Tellus*, 2(4):302–311, Nov. **1950.** 7 figs., 3 tables, 5 refs. **MH-BH**—Continuing the work reported by the authors in the *Journal of Meteorology* 6(5):367–368, Oct. 1949, the authors present the results of 3 radiosonde ascents to very high altitudes (28–32 km.) using an experimental electric dew point hygrometer. The temperature and dew point, vapor pressure and mixing ratio for heights from 14–30 km. are especially interesting. The water vapor content increases with height above the tropopause. It is believed that ice crystals carried upward and distributed laterally in the stratosphere account for this increase. *Subject Headings:* **Water vapor measurements, Stratosphere, Dew point hygrometers.**—*M.R.*

2.8–101 551.571.1:551.577:523.78

Takahashi, Yosihiko, Kubo, S., Suzuki, H. and others, **Change of clouds at Tateno and rainfall on Mt. Tsukuba.** In: Report of solar eclipse observation May 9, 1948. *Geophysical Magazine*, Tokyo, 19(3–4):152–165, Dec. **1949.** 11 figs., 3 tables, 7 refs. In English. **MH-BH**—The general weather situation at Tateno on the day of the eclipse of May 9, 1948 is described and hourly values of barometric pressure, air temperature, relative humidity, wind direction and velocity, cloud type and amount for period preceding eclipse and during eclipse and whole sky motion pictures of cloud changes during and after the eclipse are given. Apparatus and method for studying density of clouds are described. The diminution of the intensity of solar radiation with advance of the eclipse increased the density of the stratocumulus and produced an instability, which caused violent vertical interchange of cloud masses. The increasing solar radiation after maximum obscuration caused evaporation of stratocumulus and the formation of altostratus through convection. The rainfall observed during the eclipse at Mt. Tsukuba is attributed to the rapid decrease in the intensity of solar radiation. *Subject Headings:* **Clouds, Rainfall, Solar eclipses, Japan.**—*I.L.D.*

2.8–102 551.571.7:551.508.71

Griffiths, R. J., **Extremely low humidities above a subsidence inversion.** *Weather Development and Research Bulletin*, No. 16:41–46, Dec. **1950.** graph, tables. **DWB**—Describes Dobson-Brewer frost point hygrometer. First test at Melbourne, above St-Cu in a large anticyclone, gave relative humidities 6000 ft., 18; 7000, 3.3; 8000, 2.7; 10,000, 1.5%. *Subject Headings:* **Upper air humidities, Dobson-Brewer frost point hygrometer.**—*C.E.P.B.*

2.8–103 551.573

Ooi, S., **An experimental research of evaporation from a circurar (*sic.*) dish.** *Papers in Meteorology and Geophysics*, Tokyo, 1(1):133–147, Oct. **1950.** 13 figs., 8 tables, 11 refs. In English. **MH-BH**—A circular dish 1 cm. deep, 10 cm. diameter was placed in a wind tunnel edge level with a wooden plate. Wind speeds 0–7.4 m./s. Experimental data given in full. An experimental formula of TRABERT's type, but more complex, tabulated. The observations are also compared with YAMAMOTO's theoretical formula, with little agreement. A pan in a closed box was used to measure evaporation by diffusion. *Subject Heading:* **Evaporation.**—*C.E.P.B.*

2.8–104 551.574.1

Ogiwara, Sekiji, **On the solid condensation nucleus which is not soluble in water. (Studies on the formation of cloud and rain III.)** *Meteorological Society of Japan, Journal, 2nd Ser.*, 28(11):391–397, Nov. **1950.** 4 figs., 2 tables, 5 refs., 10 equations. In Japanese, English summary p. 397. **MH-BH**—Author obtained a formula for saturated vapor pressure over a thin film of water on an insoluble nucleus and found that it is lower than that over a water drop of the same size. From this he infers that a solid nucleus larger than 10^{-6} cm. radius, once well-wetted, can act as a condensation nucleus. *Subject Heading:* **Condensation nuclei.**—*C.E.P.B.*

2.8–105 551.574.1(265)

Ohta, S., **On the contents of condensation nuclei and uncharged nuclei on the Pacific Ocean and the Japan Sea.** *Meteorological Society of Japan, Journal, 2nd Ser.*, 28(10):357–366, Oct. **1950.** 3 figs., 6 tables, 9 refs., equations. In Japanese, English summary p. 365–366. **MH-BH**—Continuous counts of nuclei were made near 39°N 153°E in Pacific and 45°N 141°E in Japan Sea. Average numbers—Pacific 290/cm.^{3}, Japan Sea 1040. Low Pacific value attributed to purity of maritime air. No diurnal variation in Pacific. Ratio of charged to uncharged nuclei 1.9 in Pacific and 1.5 in Japan Sea. No effect of wind velocity up to 10 m./sec. so that ocean is not a main producer of nuclei. *Subject Headings:* **Condensation nuclei, Pacific Ocean, Sea of Japan.**—*C.E.P.B.*

2.8–106 551.574.1

Yamamoto, Gi-ichi and Miura, Akira, **Saturation vapour pressure and size of condensation nucleus.** *Meteorological Society of Japan, Journal, 2nd Ser.*, 28(12):432–440, Dec. **1950.** 5 figs., 5 tables, 2 refs., 11 equations. In Japanese, English summary p. 440. 2 equations. **MH-BH**—Two expressions are found for saturated vapor pressure over the surface of a drop in terms of its radius, mass of solute and vapor pressure over a plane surface of the same solution at the same temperature. Constants were determined for various salts. *Subject Headings:* **Vapor pressure, Condensation nuclei.**—*C.E.P.B.*

2.8–107 551.576.11

†Zaĭtsev, V. A., **Vodnost' i raspredelenie kapel' v kuchevykh oblakakh.** [Water content and distribution of drops in cumulus clouds.] *Leningrad, Glavnaia Geofizicheskaia Observatoriia, Trudy*, 19(81):122–132, **1950.** 7 figs., 2 tables, 6 refs. **DLC**—The results of 50 airplane flights through cumulus clouds, 360 measurements of water content and 600 microphotographs of drops were made. Diagrams are presented to show the distribution of water content in various cumulus clouds. The cumulus congestus shows maximum content near the center of the upper part of the cloud. Drops become larger and number of drops smaller as you go from the base to the top. For purpose of analysis each cloud is divided into 4 zones and the

properties of drops and water content are discussed and illustrated for each zone. Methods of observation are described. *Subject Headings:* **Cloud physics, Water content of clouds, U.S.S.R.** —*M.R.*

2.8–108 551.577.2(494.1)

Bouët, Max, **La dyssymétrie des régimes pluviaux au Nord et au Sud des Alpes Suisses.** [The dissimilarity of the rainfall regime in the northern and southern Swiss Alps.] *Geofisica Pura e Applicata*, 19(1–2):47–51, Jan.–March **1951.** 4 tables, 3 refs., 3 equations. French and English summaries p. 47. **DLC**—Contrasting conditions of rainfall intensity, frequency or regularity between the south side of the Alps and the north side, are shown by comparative indexes of similarity between Sion and Berne, Basel and Strasburg on one hand, and Sion and Lugano, Torino, Milano and Genova on the other. Indexes are also a function of distance between stations, as shown by comparing Strasburg with the above stations. *Subject Headings:* **Rainfall distribution, Mountain meteorology, Swiss Alps.**—*M.R.*

2.8–109 551.576.2(494.1)

Ekhart, E., **Zur Bewölkungsklimatologie der Alpen.** [Cloud climatology of the Alps.] *Geografiska Annaler*, 32(1–2):21–36, **1950.** 6 maps, table, 10 refs. **MH-BH**—The cloudiness regime of the entire Alps (French, Italian, Swiss and Austrian) is analyzed and discussed. The integrated data is used to show the normal annual variation of cloud amount with elevation for the entire region. Cloudiness increases from sea level (45%) up to 450 m. (50%) decreases to 1500 m. (52%) and increases again to 3300 m. (65%). Local variations are shown roughly by isoline charts and relation between cloudiness and rainfall index, phase and time of maximum annual cloudiness cycle, etc. shown on other detailed and original charts. *Subject Headings:* **Cloudiness, Mountain meteorology, Alps.**—*M.R.*

PRECIPITATION

2.8–110 551.577.1 551.509.6(04)

Rain formation. *Science and Culture*, 16(8):365, Feb. **1951. DWB**—Summarizes briefly two lectures on natural and artificial precipitation in Australia, delivered by E. S. Bowen before the Indian Association for the Cultivation of Science at Calcutta. *Subject Headings:* **Precipitation formation, Artificial precipitation, Addresses, Australia.**

2.8–111 551.577.1:551.594

Stefanizzi, A., **On the radioactivity of atmospheric precipitates.** *Journal of Geophysical Research*, 55(4):373–378, Dec. **1950.** 2 figs., 2 tables, 9 refs., equation. **MH-BH**—The method of filtration was used for separating the radioactive products of precipitates. Thirty-three cases of atmospheric precipitation were analyzed for radioactivity. The curve of the logarithm of saturation intensity of the precipitate plotted against time indicates that only the decay products of radon were present in the precipitates. The author concludes that some radioactivity was acquired by precipitates during their fall from the clouds to ground level; that snow is more active than rain; and that rain in thundershowers is more active than ordinary rain. Also presence of thoron decay products in precipitates was detected. *Subject Headings:* **Precipitation, Atmospheric electricity.**—*I.L.D.*

2.8–112 551.577.3:581.03

Glock, Waldo S., **Tree growth and rainfall—a study of correlation and methods.** *Smithsonian Miscellaneous Collections*, 111(18), Oct. 25, **1950.** 47 p. 7 figs., 21 tables, 10 refs., formula. **MH-BH**—Cores taken from 9 pines or firs in Holman Pass, New Mexico, were measured and annual growth correlated with rainfall for different groups of months at 7 neighboring stations, using "trend" method. Some large coefficients were found, approaching unity with rainfall March–July. Correlations were also calculated between different groups of trees and between different rainfall stations, but were only fair. There were considerable variations from tree to tree, the wettest sites giving best results. *Subject Headings:* **Precipitation variations, Dendrochronology.**—*C.E.P.B.*

RAIN

2.8–113 551.578.1

Blanchard, Duncan C., **The behavior of water drops at terminal velocity in air.** *American Geophysical Union, Transactions*, 31(6):836–842, Dec. 1950. 7 figs., 14 refs. **MH-BH**—In order to shed light on the behavior of large raindrops the author has studied the behavior of large water drops, five to ten millimeters in diameter in a vertical air stream, produced in a specially designed wind tunnel. A description and diagram of the wind tunnel are given. Deformation, type of oscillation, growth and mechanics of breakup of the water drops were investigated by stroboscopic photographs. Extreme periodic deformations into ellipsoidal shapes occur on drops with a diameter of more than five millimeters. Drops which come within seven centimeters above another drop increase in velocity and fall in a tightening spiral path until collision occurs. The bombardment of large drops with a spray of small droplets, approximately $\frac{3}{4}$ mm. did not result always in coalescence of the small with the large drops; the former occasionally manifested a "bounce off" effect. Turbulence producing a sudden upward acceleration of air causes disintegration; downward acceleration is relatively ineffectual in producing breakup of water drops. The disintegration of large drops is attributed to periodic deformation. *Subject Heading:* **Raindrop velocities.**—*I. L. D.*

2.8–114 551.578.11

Bowen, E. G., **The formation of rain by coalescence.** *Australian Journal of Scientific Research, Ser. A, Physical Sciences*, 3(2):193–213, June 1950. 12 figs., 2 plates, 2 tables, 16 refs., 8 equations. **MH-BH**—The author develops a theory to explain the production of rain from clouds below the freezing level by assuming that after the initial growth of cloud droplets by condensation a small proportion of their number continues to grow by coalescence. Calculations of the rates of growth of cloud droplets by condensation and coalescence and of their trajectories through clouds are made and it is shown that unless cloud droplets grow also by coalescence none of the droplets will grow large enough to fall against the upward air current in order to fall as rain. The maximum height reached by the drops and the final diameter of the rain drops emerging from the base of the cloud are nearly a linear function of the vertical air velocity. The final size of the raindrops is less affected by degree of supersaturation and cloud water content. The time for rain to form is inversely proportional to the vertical air velocity. Observations on raindrop density and rain water content at different heights of non-freezing clouds made by ground and airborn radar indicate two types of rain where characteristics correspond with deductions from the theory. The characteristics of these rainfalls are described; the radar and radiosonde data are presented; and the conditions that must exist in clouds before rain can form by condensation-coalescence are discussed. *Subject Heading:* **Raindrop coalescence.**—*I. L. D.*

2.8–115 551.578.11

Gunn, Kenrick and Hitschfeld, Walter, **A laboratory investigation of the coalescence between large and small water-drops.** *Journal of Meteorology*, 8(1):7–16, Feb. 1951. 12 figs., table, 17 refs., 3 equations. **MH-BH**—The growth of rain drops in clouds by coalescence of rain drops with cloud drops was investigated experimentally by observing the growth of raindrops falling through a 3 meter column of laboratory-made cloud. The increase in mass of the drop is measured by the collection efficiency $E' = \Delta M(\pi S^2 wh)^{-1}$, where w = mass of cloud water in unit volume of cloud, h = height of cloud, ΔM = net increase in mass of falling drop and S = radius of drop. The experimental arrangement for producing the drops and clouds and the procedure for measuring the liquid water content of the cloud and the size of the cloud droplets are described with the aid of diagrams. The collection efficiencies of a drop of 1.50 mm. radius falling through three clouds having different droplet sizes agreed with the aerodynamic collision efficiencies calculated according to LANGMUIR's theory; every drop-droplet collision resulted in coalescence; charges of the order of 0.2 e.s.u. per drop did not influence collection efficiency. *Subject Heading:* **Raindrop coalescence.**—*I. L. D.*

2.8–116 551.578.11

Gunn, Ross, **Mechanical resonance in freely falling raindrops.** *Journal of Geophysical Research*, 54(4):383–385, Dec. 1949. fig., 3 refs., equation. Summary p. 383. **MH-BH**—

Droplets of weight about ½ milligram falling through still air drift 2–3 ft. in 50 ft. This is attributed to resonance with eddies formed by the drop. The natural oscillation frequency of the drop coincides with eddy frequency at about ½ milligram. *Subject Headings:* **Raindrop velocities, Cloud physics.**—*C.E.P.B.*

SNOW

2.8–117 551.578.4(494)

Boettcher, P., **The avalanche catastrophe in the Alps, 19–21 January 1951.** *Weather*, 6(4):105–107, April **1951.** plate. **DWB**—Area affected was the largest in history. Snow was deep by Jan. 16, and much more fell in a stationary front Jan. 19–21 (water equivalent 138 mm. at Davos). A northwest wind of 115 m.p.h. built up loose snow masses and released avalanches; warm air caused a surface thaw up to 1800 m. and formed a sliding surface. *Subject Headings:* **Avalanches, Snowfall extremes, Alps.**

2.8–118 551.578.4:06

Farrow, Richard C., Barnes, Howard T., Church, J. E. and others, **Report of the Committee on Snow 1942–48.** *American Geophysical Union, Transactions*, 30(3):444–447, June **1949. DWB** —Brief notes on the activities of organization and individuals engaged in snow research chiefly in the United States and Canada. The studies carried out cover the physics of snow, the relationship between snowmelt and stream flow, forecasting stream flow from snow melt, meteorological factors involved in snow melt, snow surveying, etc. *Subject Headings:* **A.G.U. Snow Committee, Snow research.**—*I.L.D.*

2.8–119 551.578.4:06

Farrow, Richard C., Church, Phil E., Gerdel, R. W. and others, **Report of the Committee on Snow, 1948–1949.** *American Geophysical Union, Transactions*, 30(6):907–910, Dec. **1949. DWB**—Brief description of snow survey of Andes, wind studies of shielded snow gages and measurement of water transmission through snow. *Subject Headings:* **Snow research, A.G.U. Snow Committee.**—*C.E.P.B.*

2.8–120 551.578.4:551.501.9:551.579

Cooperative snow investigation. Progress Report 1945–1950. *U. S. Corps of Engineers and U. S. Weather Bureau, Technical Report* No. 6-4, Oakland, Calif., March **1950.** 56+p. 4 plates, numerous figs. and tables in append. **DWB**—A map of western United States shows location of cooperative snow investigation laboratories established since 1945 (Sierras, Cascades and Northern Rocky mountains). History of program and development of the 3 laboratories outlined. Staff and activities of laboratories described. Data on snow physics and snow melt micrometeorological data, radiation data and instrumentation presented in analytical tables and charts and discussed. Cooperation with other agencies mentioned. *Subject Headings:* **Snow surveys, Observational networks, Hydrometeorology.**—*M.R.*

HYDROMETEOROLOGY

2.8–121 551.579:001

Dębski, Kazimierz, **Systematyka hydrologii.** [Classification of hydrology.] *Przegląd Meteorologiczny i Hydrologiczny*, Warsaw, No. 1–4:3–14, **1949.** 3 figs., 3 refs. English summary p. 14. **DWB**—The author presents a classification of hydrology, elaborated by a commission on hydrologic terms of the Association of Reclamation Engineers of Poland. The criteria are the place of the phenomena investigated or a horizontal division, the meteorological approach or a vertical division and the kind of phenomena or a thematic division. Horizontal division—hydrometeorology, potamology, limnology, oceanology, pedohydrology, geohydrology, hydrogeology; vertical—hydrometry, hydrography, scientific hydrology; thematic division—hydrochemistry, hydrophysics, hydrobiology, circulation hydrology. *Subject Heading:* **Hydrologic classification.**—*I.L.D.*

2.8–122 551.579

Kelly, L. L., **Technical aspects of USDA Watershed Program for the Missouri Basin.** *Agricultural Engineering*, 31(9):466, 468, Sept. **1950.** 2 tables. **DA**—A comprehensive program for flood control, water utilization, soil conservation, etc. is outlined. Lack of hydrologic data is mentioned. Effect of increased vegetative cover on climate and vice versa is to be studied. Several test areas, such as one of 50 square miles in Central Nebraska, were used to determine effects of measures on small watersheds. *Subject Headings:* **Water resources, Conservation, Missouri Basin.**—*M.R.*

2.8–123 551.579:551.588.6

Lieberman, J. A. and Hoover, Marvin D., **Stream-flow frequency changes on Coweeta Experimental Watersheds.** *American Geophysical Union, Transactions*, 32(1):73–76, Feb. **1951.** 3 figs., 2 tables, 5 refs. **MH-BH**—*Subject Headings:* **Runoff, Forest influences, Watersheds, South Carolina.**

2.8–124 551.579:551.526.8

Melin, Ragnar, **Undersökningar vid Sveriges Meteorologiska och Hydrologiska Institut över vattendragens isförhållanden.** [Investigations at the Meteorological and Hydrological Institute of Sweden concerning the ice conditions on lakes and rivers.] *Sweden, Meteorologiska och Hydrologiska Institut, Meddelanden, Ser. D*, No. 1, **1947.** 50 p. 23 figs., 4 tables, 7 refs. English summary p. 47–49. **MH-BH**—Extensive lake regulation in northern Sweden has affected water flow and ice conditions, interfering with timber storage and traffic. The investigation described here was to provide a basis for assessing damages. Diagrams show variation of water temperature with depth and sections of ice sheets. *Subject Headings:* **Lake temperatures, Lake ice.**—*C.E.P.B.*

2.8–125 551.579

Schiff, Leonard, **Surface detention, rate of runoff, land use, and erosion relationships on small watersheds.** *American Geophysical Union, Transactions*, 32(1):57–65, Feb. **1951.** 5 figs., 4 tables, 2 refs. **MH-BH**—*Subject Headings:* **Runoff, Soil erosion, Infiltration, Watersheds.**

2.8–126 551.579:482.2

Shul'ts, V. L., **Reki Sredneĭ Azii.** [Rivers of Central Asia.] *Vsesoiuznoe Geograficheskoe Obshchestvo, Zapiski, Novaia Seriia*, Vol. 8, **1949.** 195 p. numerous figs., tables and refs., equations. **DLC**—A thorough treatment of the hydrology of Central Asia of the various river basins therein, including discussion of evaporation, evapotranspiration, hydrological forecasting, classification of rivers, climatic changes and their effect on runoff in desert regions, effect of temperature, snowmelt, rainfall, soils, seepage, maximum (flood), minimum (drought) and average runoff, sediment and erosion. An excellent 6 page bibliography gives, by chapters, citations to numerous Russian and American papers on arid-zone hydrology. *Subject Headings:* **Hydrology, River basins, Central Asia.**—*M.R.*

2.8–127 551.579.1(02) 628.1

Hobbs, Aubrey Thomas (ed.), **Manual of British water supply practice.** Cambridge, W. Heffer & Sons, [**1950**]. 910 p. 105 figs., 130 tables, 5 nomograms (in pocket), numerous refs. (Great Britain, Institution of Water Engineers.) **DLC**—This work by 87 authors covers the whole field of water supply and water engineering in a most comprehensive way. It begins with chapters on historical development and fundamental considerations. Chap. 3, "Hydrology" (p. 58–96, 37 refs.), includes sections on rainfall, temperature, sunshine, humidity, wind and evaporation. Reliability of rainfall is studied on the statistical basis of the mean deviation. The other elements affect evaporation and run off; the basic formula for the average annual loss of water is expressed as $4.8\sqrt[3]{R}$, where R is the average rainfall, but a more general formula for loss of soil water is $0.57R^{.87}+1.10(T\text{-}48)+.006(S\text{-}1450)$, T = mean air temperature, S annual sunshine in hours. Droughts are defined and the most severe described. Other formulas describe intensity of heavy rainfall in terms of duration and area, flood formulas and

flood hydrographs, reservoir storage and yield, etc. The remaining chapters deal with hydrogeology, all the various engineering aspects, hygiene, water softening, and the legal and financial aspects of water supply. *Subject Headings:* **Water supply, Hydrology, Manuals.**—*C.E.P.B.*

2.8–128 551.579.4:551.481.1(494.1)

De Marchi, Giulio, **Caratteristiche idrologiche e idrauliche dei grandi laghi subalpini.** [Hydrologic and hydraulic characteristics of large sub-Alpine lakes.] *Istituto di Idraulica e Costruzioni Idrauliche del Politecnico di Milano, Memorie e Studi*, No. 84, **1950.** 7 p. 9 tables, equations. **MH-BH**—Author tabulates characteristics of 5 sub-Alpine lakes, inflow, outflow, volume change and apparent loss. Smoothing of flow is given by $q=a+\beta h$ where q, a are outflow and inflow and β is a constant depending on area of lake and rate of change of level. *Subject Headings:* **Hydrology, Lakes.**—*C.E.P.B.*

CLIMATOLOGY AND BIOCLIMATOLOGY

CLIMATOLOGY

2.8–129 551.58:06

Thornthwaite, Charles Warren, Biel, Edwin R., Church, Phil E. and others, **Report of the Committee on Climatology 1947–1948.** *American Geophysical Union, Transactions*, 30(3):439–443, June **1949.** **DWB**—Various problems with which climatology should be concerned are discussed. The more important of these are as follows: the climatology of cities and the dilution or lack of dilution of atmospheric contaminants, investigation of fluctuations in climate in North America during the period of instrumental observation, and a comparison of climatic trends with some function that give an indication of the changes in the circulation of the atmosphere in the Northern Hemisphere that have occurred during the period when various climatic factors have been changed. Various definitions of climatology are presented. The extension of studies on evapotranspiration from natural surfaces and the microclimatological research at Seabrook, N. J., University of Texas and the University of California at Los Angeles are discussed. *Subject Heading:* **A.G.U. Climatology Committee, Problems in climatology.**—*I.L.D.*

2.8–130 551.581

Budyko, M. I., **Klimaticheskie faktory vneshnego fiziko-geograficheskogo protsessa.** [Climatic factors of the external physico-geographical process.] *Leningrad, Glavnaia Geofizicheskaia Observatoriia, Trudy*, 19(81):25–40, **1950.** 13 figs., 17 refs., 4 equations. **DLC**—The latitudinal variations in the basic elements of the heat and water balance for the continents and the oceans, and for the Northern Hemisphere, are presented graphically and discussed. Data used in this study are obtained from the work of L'VOVICH (1945), JACOBS (1943) and MEINARDUS (1934). Next the diurnal variations in turbulent exchange of heat and moisture are discussed theoretically (after WUNDT, 1937) and the theory applied to the various geographic regions of the U.S.S.R. (tundra, forest, steppe, semi-arid and desert) in order to determine the relation between vegetation regions and the heat/moisture balance. The relation between runoff and precipitation is shown in theory and practice and, finally, the optimum climatic conditions determined by a process of integrating radiation, moisture and physico-geographical processes. *Subject Headings:* **Radiation balance, Hydrologic cycle, U.S.S.R.**—*M.R.*

2.8–131 551.582:551.588.1:551.46(899)

Bergeiro, José María, **La influencia marítima en el clima del Uruguay.** [Maritime influence on the climate of Uruguay.] *Revista Meteorológica*, Montevideo, 9(35):151–168, Oct. **1950.** 9 figs. **DWB**—Effects of air masses and air flow from oceanic or continental portions of the Southern Hemisphere on temperature and rainfall of Uruguay compared. Microclimatic conditions during normal and abnormal situations discussed, and climagrams and other schematic charts presented by way of illustration. Usefulness of oceanographic research for forecasting weather and interpreting climate stressed. *Subject Headings:* **Climatology, Marine influence, Oceanographic research, Uruguay.**—*M.R.*

2.8–132 551.582(593)

*Bunnag, Charoon V., **Climates of Siam.** *Thailand, Meteorological Dept., Royal Siamese Navy, Scientific Articles*, No. 4, Aug. **1947.** 16 p. 13 figs., 5 tables. **DWB**—A fairly detailed treatment of the general climatic features (temperature, rainfall, cloudiness, wind and fog) in each of 5 major regions of Siam. Histogram charts, wind roses and other visual presentation supplement the general tables of monthly mean values for each of 9 stations in the 5 regions, and a discussion of seasonal peculiarities. *Subject Headings:* **Climatology, Thailand.**—*M.R.*

2.8–133 551.582(94)

Chidlow, Teresa A., **Geography and development of land utilization in Seabrook, Western Australia.** *Western Australia University, Geographical Laboratory, Dept. of Economics, Research Report* No. 15, May **1950.** 8 p. **MH-BH**—Climate of Seabrook (31°36–46′N, 116°42–48′E) is briefly described (Mediterranean type) with notes on frosts, soil and vegetation. *Subject Headings:* **Climatology, Seabrook, Australia.**—*C.E.P.B.*

2.8–134 551.582:629.13

*Nurminen, Aili, **Wind, visibility, and fog conditions at Pori Aerodrome.** *Finland, Ilmatieteellisen keskuslaitoksen, Toimituksia*, No. 28, **1946.** 25 p. 10 figs., 11 tables, 7 refs. **DWB**—Wind roses and data for Pori, supplemented by data from Sappi Is., Kokemäki and Lauttakylä, and a tabular and graphic presentation of data on visibility and radiation fog (compiled from hourly or 3-hourly observations made from July 1941 through June 1946 at Pori) are included along with an excellent analysis and discussion of storms, wind and flying conditions at Pori Airport. *Subject Headings:* **Aeronautical climatology, Pori Airport, Finland.** —*M.R.*

2.8–135 551.582(517)

Pond, Alonzo W., **Climate and weather in the central Gobi of Mongolia.** *U. S. Air Force, Arctic, Desert, Tropic Information Center, Publication* D-101, March **1951.** 9+p. map, 5 tables, 25 refs., 9 appends. **DWB**—This is a brief description of the climate and weather in the central Gobi of Mongolia. Visibility, temperature, wind, precipitation, clouds and humidity are discussed. Tables give data on daily temperatures for 1931 and 1932, daily temperature ranges, maximum and minimum temperatures and data on precipitation, wind, humidity and mean monthly temperatures. A bibliography and map are given. *Subject Headings:* **Climatology, Gobi Desert.**—*I.L.D.*

MICROCLIMATOLOGY

2.8–136 551.584:551.571.35:63

Shaw, R. H. and Waggoner, Paul E., **An evaluation of dew point fluctuations in the microclimatic layer.** *American Meteorological Society, Bulletin*, 31(10):382–384, Dec. **1950.** table, 5 refs. **MH-BH**—The daily and height variations of the dew-point temperature in corn, soy beans and over freshly plowed soil were measured during August 1948 at Ames, Iowa, by means of a photoelectric dew point recorder. Observations, each consisting of a series of one to three minute runs, were made hourly at heights which ranged from one inch to sixty inches above the ground. "The variations are presented as a standard deviation of a frequency distribution of the dew point temperatures taken at half-second intervals during a minute run." Representative results are given. The limitations of the procedure are discussed. *Subject Headings:* **Microclimatology, Dew point, Agricultural meteorology.**—*I.L.D.*

2.8–137 551.584 551.508

*Thornthwaite, Charles Warren, **Micrometeorology of the surface layer of the atmosphere.** *Johns Hopkins University, Laboratory of Climatology, Seabrook, New Jersey, Interim Report* No. 11, **1950.** 98 p. 14 figs., 4 tables, 17 append. **DWB**—The research in progress is summarized. Modifications of the portable dew point hygrometer, described in earlier reports, are discussed. Standard error of the mean difference in temperature between adjacent levels is calculated. A multiple energy balance instrument for measuring simultaneously air temperature and wind velocity is described. Data are presented on air temperature, soil tem-

perature, wind velocity, radiation, dew point gradient, evapotranspiration at Seabrook, N. J. (*See item* No. 2.6–130 in June 1951 *Meteorological Abstracts.*) *Subject Headings:* **Microclimatology, Instruments, Seabrook, New Jersey.**—*I.L.D.*

CLIMATIC CLASSIFICATION

2.8–138 551.585

Angervo, J. M., **Eine neue Klimakarte der Erde nach der Köppenschen Klassifikation.** [A new climatic chart of the world according to Köppen's classification.] *Finland, Ilmatieteellisen keskuslaitoksen, Toimituksia*, No. 23, **1944.** 15 p. 2 figs., fold. map. **DWB**—The system of classification and recent literature on classification of climates are reviewed, followed by a discussion of the new boundaries or limits for the various types, and the revised chart of the world based on the new limits. *Subject Headings:* **Climatic classification, Köppen's system of classification.**—*M.R.*

2.8–139 551.585(675)

Bultot, F., **Carte des régions climatiques du Congo belge établie d'après les critères de Köppen.** [Map of the climatic regions of the Belgian Congo based on Köppen's system.] *Institut National pour l'Étude Agronomique du Congo Belge, Bureau Climatologique, Communication* No. 2, **1950.** 15 p. chart, 9 refs. **DWB**—The Belgian Congo belongs largely to the Af, Am and Aw zones of KÖPPEN but also the climatic zones As and Cf and Cw are found. Their characteristics and ecologic significance are discussed. A large map, showing the Belgian Congo classified according to the Köppen classification, is included. *Subject Headings:* **Climatic classification, Köppen's system of classification, Belgian Congo.**—*I.L.D.*

2.8–140 551.585(94)

Gentilli, J., **Two climatic systems applied to Australia.** *Australian Journal of Science*, Sydney, 11(1):13–16, Aug., **1948.** 2 figs., map, 24 refs. **MH-BH**—A comparative study of climatic types in Australia, with maps, according to systems of KÖPPEN (1932) and THORNTHWAITE (1931) with a large colored map of the latter. *Subject Heading:* **Climatic classification.** —*C.E.P.B.*

2.8–141 551.585

Hare, F. Kenneth, **Climatic classification.** (In **London Essays in Geography, Memorial Volume.** Rodwell Jones, L. Dudley Stamp and S. W. Wooldrige (ed.). Cambridge, Harvard University Press, **1951.** p. 111–134. 3 figs., table, 32 refs.) **DLC**—A critical study of KÖPPEN's (1900) and THORNTHWAITE's (first 1931 and second 1948) classifications and of the use of the *moisture index* and thermal efficiency concepts. Most climatic classifications are devised by and used for ecology and are of little use to workers in other fields. Several attempts to improve on Köppen's system by shifting limits, are described. The precipitation ratio concept has grown in favor since 1905 (TRANSEAU) and has been used by LANG (1920), DE MARTONNE (1927) and others besides THORNTHWAITE. The latter has presented the most refined system, but it still takes no account of the relation to human activity. *Subject Headings:* **Climatic classification, Evapotranspiration.**—*M.R.*

2.8–142 551.585

Okołowicz, Wincenty, **"Porównanie klimatu Stanów Zjednoczonych Ameryki Północnej i Europy—Ze specjalnym uwzględnieniem Polski i jej wybrzeży Baltyckich."** [Concerning the comparison of climate of the United States and Europe—With special attention to Poland and her Baltic Coast."] *Przegląd Meteorologiczny i Hydrologiczny*, Warsaw, No. 1:84–88, April **1948.** English summary p. 5. **MH-BH**—*Subject Headings:* **Climatic classification, United States, Poland.**

2.8–143 550.585:63

Vahl, Martin and Humlum, Johannes, **Vahl's climatic zones and biochores.** *Acta Jutlandica, Aarskrift*, Copenhagen, 21(6), **1949.** 79 p. 16 figs., 19 tables, 20 refs. **DLC**—The system of climatic zones and biochores developed by MARTIN VAHL of Denmark is based upon

the relationship between plant growth and critical mean temperature and precipitation values. Where vegetation limits can be determined by mean isotherms for the coldest or warmest month or months the dependence between the mean temperature of the coldest and warmest months can be represented by a general equation $W=a+bc$ (W and c mean temperatures of warmest and coldest months respectively; a and c constants fixed by local temperatures along the limits of vegetation where climatic demands are to be defined). The application of this formula to the definition of the polar limit of wheat and of the northern forest regions and to various biochores is illustrated and the mean isotherms and precipitation probabilities, defining climatic zones and biochores are given. The climates, natural vegetation and cultivated crops, characterizing the various climatic zones and their constituent biochores, are described and the areas of these geographic regions are determined and represented on maps. The distribution of world population and the world production of grain in relation to VAHL's climatic zones and biochores are discussed. *Subject Headings:* **Climatic classification, Agricultural climatology.**—*I.L.D.*

2.8–144 551.585.7:523.78

Huzimura, I., **The effect of solar eclipse on the meteorological elements at various altitudes along the slope of Mt. Huzi.** In: Report of solar eclipse observation May 9, 1948. *Geophysical Magazine*, Tokyo, 19(3–4):94–114, Dec. **1949.** 22 figs. In English. **MH-BH**—Meteorological observations were made at several points on Mt. Huzi (Fuji) during the day of an eclipse and on the immediately preceding and following days. The effect of the eclipse upon solar radiation, soil and air temperature, wind velocity and direction and vapor tension at the various stations is discussed. The convective motion in the free atmosphere decreased with advance of the eclipse. The drop in temperature, 4°C., was greatest at 500–1000 meters above sea level; at 3800 meters above sea level it was 0.7°C. Wind velocity decreased at lower elevations; no systematic change in wind direction was observed; vapor pressure decreased with eclipse; atmospheric pressure reached a minimum just before time of maximum of eclipse. The retardation or the time difference between the maximum obscuration and the manifestation of the maximum effect of the eclipse is discussed for the various meteorological elements. The meteorological data are presented both numerically and graphically. *Subject Headings:* **Weather conditions, Mountain meteorology, Solar eclipses, Japan.**—*I.L.D.*

BIOCLIMATOLOGY

2.8–145 551.586:551.510.41

Borgard, W. and Bunzl, C., **Bioklimatische Forschung und ärztliche Praxis.** [Bioclimatic investigation and medical practice.] *Annalen der Meteorologie, Medizin-meteorologische Hefte*, No. 4:48–53, **1950.** 9 figs., 3 tables, 11 refs. **MH-BH**—From observations at Munich authors conclude that the only factor of much importance is the amount of ozone in the air near the ground. Examples of diurnal variation are given, also comparisons between day-to-day variation of oxidising power and various physiological conditions, secretions, etc. *Subject Headings:* **Bioclimatic research, Medical meteorology, Ozone.**—*C.E.P.B.*

2.8–146 551.586:06

Stühmer, A. and Pfister, Rudolf (comps.), **Bericht über die Erste Tagung der Freiburger Arbeitsgemeinschaft für bioklimatische Forschung vom 24. bis 26. März 1950 in Freiburg im Breisgau (Kaufhaussaal).** [Report on the first meeting of the Freiburg Working Committee for bioclimatic research, 24–26 March 1950 in Freiburg (Chamber of Commerce).] *Annalen der Meteorologie, Medizin-meteorologische Hefte*, No. 4:1–53, **1950.** **MH-BH**—Opening address by A. STÜHMER. The individual papers are analyzed separately. To be continued in *ibid.* No. 5. (For report on same conference by H. BERG *see item* 2.4–173 in April 1951 *Meteorological Abstracts.*) *Subject Headings:* **Bioclimatic research, Conferences.**—*C.E.P.B.*

2.8–147 551.586:612

Hungerland, H., **Einfluss des Wetters auf das Gedeihen des Säuglings.** [Influence of weather on the thriving of infants.] *Annalen der Meteorologie, Medizin-meteorologische Hefte*, No. 4:32–35, **1950.** table. **MH-BH**—Maximum total loss of weight in infants

occurred 1 day before passage of warm front, 1 day after cold front, on day of occlusion and 2 days after free föhn. Variations small but significant. *Subject Heading:* **Physiological climatology.**—*C.E.P.B.*

2.8–148 551.586:612

Lehmann, Gunther, **Adrenalinbestimmung und ihre Anwendung für die Frage der Bioklimatik.** [Determination of adrenalin and its application to bioclimatic problems.] *Annalen der Meteorologie, Medizin-meteorologische Hefte,* No. 4:30–32, **1950.** 2 figs. **MH-BH**—Adrenalin content can be determined from 0.2 cc. blood and is an index of many physiological states (blood pressure, pulse rate, blood sugar etc.) and feeling of well being. Its variations are often but not always related to those of air pressure. *Subject Heading:* **Physiological climatology.**—*C.E.P.B.*

2.8–149 551.586:612

Mrose, Helmut, **Über die Ursachen der Schwüleempfindung.** [On the causes of the sensation of sultriness.] *Zeitschrift für Meteorologie,* 5(2):55–58, Feb. **1951.** table, 8 refs. **MH-BH**—A feeling of sultriness always occurs with equivalent temperature of 50°C. or wet-bulb 18°C. It may occur with lower heat content when the sky radiation is strong, especially in the infrared from a thin sheet of middle cloud. Observations with two katathermometers in Friedrichroda showed that in sultry cloudy weather the cooling power was greater under a shelter than in the open. The sultry feeling with diffuse radiation is attributed to the uniformity of temperature and hence the absence of air motion. *Subject Headings:* **Physiological climatology, Cooling power.**—*C.E.P.B.*

2.8–150 551.586:615.8

Amelung, W., **Klimatische Behandlung im Mittelgebirge.** [Climatic treatment in the Mittelgebirge.] *Annalen der Meteorologie, Medizin-meteorologische Hefte,* No. 4:35–42, **1950. MH-BH**—After a general discussion of climatic therapy, author describes Mittelgebirge as a forest climate with local peculiarities, but generally pure air, good sunshine and irradiation and, most important, the free "anticyclonic" föhn. He then considers effects on various diseases and, finally, the methods of climatic therapy. *Subject Headings:* **Climatotherapy, Mittelgebirge, Germany.**—*C.E.P.B.*

2.8–151 551.586:615.8

Melzer, E., **Klimatherapie der Tuberkulose.** [Climatic therapy of tuberculosis.] *Annalen der Meteorologie, Medizin-meteorologische Hefte,* No. 4:42–46, **1950. MH-BH**—Tuberculosis therapy is based on an alternation of rest and stimulus, in which weather plays a large part. The most important stimulus is sun and sky radiation, which depends, especially the UV part, on purity of air and ozone content. High level resorts have the advantage here, but strict dosage is important to avoid over-stimulation. Weather changes are mostly unfavorable. Nine desiderata in the climate are specified. *Subject Headings:* **Climatotherapy, Tuberculosis.**—*C.E.P.B.*

2.8–152 551.586:615.8

von Philipsborn, E., **Die Indikationen für Klimakuren.** [Indications for climatic cures.] *Annalen der Meteorologie, Medizin-meteorologische Hefte,* No. 4:47–48, **1950. MH-BH**—Different patients react differently to various climatic stimuli (mountain or sea climate) and it is necessary to understand the reactions of their constitutions. More precise knowledge of climatic stimuli is required. *Subject Headings:* **Climatotherapy, Health resorts.**—*C.E.P.B.*

2.8–153 551.586:616

de Rudder, Bernard, **Meteorologie und Krankheitsgeschehen.** [Meteorology and incidence of disease.] *Annalen der Meteorologie, Medizin-meteorologische Hefte,* No. 4:2–5, **1950.** 3 figs., 2 tables, 13 refs. **MH-BH**—The statistical basis is coincidence, in excess of probability, of beginning of illness with weather processes. Example, in N days n had disturbed weather (passage of front). Of K_N onsets of illness, K_n came on these n days. Index $M = N.K_n/(nK_N)$. Effect occurs through variable capillary resistance of subjects susceptible

to weather; several examples quoted. Seasonal effects have hitherto been neglected. *Subject Headings:* **Medical meteorology, Pathology.**—*C.E.P.B.*

2.8–154 551.586:616

Sarre, H. and Betz, L., **Klimatische Einflüsse auf den Blutdruck des Hypertonikers.** [Climatic influences on the blood-pressure of hypertonics.] *Annalen der Meteorologie, Medizin-meteorologische Hefte,* No. 4:26–29, **1950.** 2 figs., 2 tables. **MH-BH**—At Frankfort a high +correlation was found between changes of air pressure and blood pressure, especially during passage of fronts. Apoplectic subjects however reacted oppositely to pressure variations. *Subject Heading:* **Medical meteorology.**—*C.E.P.B.*

2.8–155 551.586:616

Schulze, R., **Über "Wetter und Krankheit" vom Standpunkt des Meteorologen.** [On "weather and disease" from the standpoint of the meteorologist.] *Annalen der Meteorologie, Medizin-meteorologische Hefte,* No. 4:6–10, **1950.** 3 figs. fold., 12 refs. **MH-BH**—Effect of weather changes on vegetative nervous system is a scientific fact, but specific diseases affected are only a matter of experience. The meteorological agency is the sudden change of the general weather situation—physical and chemical environment and radiation. The relations are shown in "biometeorograms" for May 1–10, 1950, at Hamburg—clinical side, incidence of numerous diseases; meteorological side, temperature, air mass (to 10 km.), radiation, ozone content, vertical mass-exchange. *Subject Heading:* **Medical meteorology.**—*C.E.P.B.*

2.8–156 551.586:551.43

Mörikofer, W., **Zur Bioklimatologie des Hochgebirges.** [On the bioclimatology of high mountains.] *Annalen der Meteorologie, Medizin-meteorologische Hefte,* No. 4:10, **1950. MH-BH**—"High mountain" defined as 1200–2000 meters. The favorable climatic features are briefly summarized. *Subject Heading:* **Mountain meteorology.**—*C.E.P.B.*

2.8–157 551.586:628.8:656.6

Bullen, Francis Lisle, **The ventilation and heating of ships.** 3 ed. Liverpool, Birchall & Sons, **1950.** 175 p. illus. Unchecked. Review by C. E. N. Frankcom in *Marine Observer,* 21(151):32–34, Jan. **1951. DWB**—Deals with: properties of air, ventilation requirements, methods of ventilation, air conditioning, etc. The meteorological aspect of ventilation and the effect of various conditions of humidity and temperature on the human body and cargo are dealt with clearly, including the complications caused by different humidity requirements of different commodities. *Subject Headings:* **Heating and ventilating, Marine meteorology.**—*C.E.P.B.*

2.8–158 551.586:637

Hounam, C. E., **Climate of the western district of Victoria.** *Australia, Meteorological Bureau, Studies in applied climatology, Pamphlet* No. 3, **1949.** 52 p. 30 maps, 4 tables, 6 refs. **DWB**—The temperature and rainfall of the western district of Victoria has been analyzed with particular reference to dairying needs. The seasonal fluctuations in pasture growth, resulting from seasonal variations in temperature and precipitation, are discussed. Data are presented on mean and extremes of temperature, on frost frequency, on mean annual, mean monthly and mean seasonal rainfall, on seasonal rainfall probability and on "effective rainfall" (a concept which was developed by PRESCOTT and which relates the balance of moisture received as rainfall and lost by evaporation to the growing requirements of plants). Maps showing mean dates of occurrence of first and last minimum temperatures, the mean seasonal rainfall and annual and seasonal rainfall probability are presented. *Subject Headings:* **Agricultural climatology, Dairying, Victoria, Australia.**—*I.L.D.*

UPPER AIR AND SYNOPTIC CLIMATOLOGY

2.8–159 551.587

Great Britain. Meteorological Office, **Upper air climatology of the Southern Hemisphere.** *Meteorological Magazine,* London, 80(944):52–56, Feb. **1951.** 9 refs. **DWB**—Discussion

opened by L. S. CLARKSON on recent papers by F. LOEWE and U. RADOK, J. W. HUTCHINGS, and H. FLOHN, containing meridional sections of temperature, pressure, zonal wind. The jet stream is found 10° nearer the equator than in Northern Hemisphere. *Subject Headings:* **Upper air climatology, Southern Hemisphere.**—*C.E.P.B.*

2.8–160 551.589.1(439.1) 551.577.2

Aujeszky, László, **Tíz milliméteren felüli csapadékmennyiséget szolgáltató frontok statisztikája Budapesten, 1946–1949.** [Single warm and cold fronts yielding at least 0.4 in. of precipitation at Budapest, 1946–1949.] *Időjárás*, 54(3–4):126–138, March–April **1950.** 2 tables, 2 refs. English summary p. 132. **MH-BH**—A tabulation of individual warm and cold front passages over Hungary, analyzed according to the amount of precipitation which occurred in each. The same number of warm fronts as cold fronts brought 10 mm. of precipitation, but twice as many warm fronts yielded 20 cm. as did cold fronts. *Subject Headings:* **Synoptic climatology, Budapest, Hungary.**—*M.R.*

2.8–161 551.589.1

Reichel, Eberhard, **Methodische Betrachtungen zur regionalen Klimakunde.** [Methodical considerations of regional climatology.] *Geofisika Pura e Applicata*, Milan, 14(1–2), **1949.** 19 p. 66 refs. German and English summaries p. 1. Reprint available. **DLC**—The paper deals with the application of daily synoptic data to weather history (dynamic climatology). Weather patterns depend on characteristics of air masses near the ground and in vertical stratification, resulting from their life history. A simplified generally applicable classification is required. Author then discussed fronts (in local weather), general weather types and their cartography, and advocates use of punch cards for statistical work on frequencies. The objective is the determination of geographical effects on meteorological processes and modification of air masses. *Subject Heading:* **Synoptic climatology.**—*C.E.P.B.*

MISCELLANEOUS APPLICATIONS

OPTICAL PHENOMENA

2.8–162 551.591:551.510.42

Hoover, Robert A., **A study of visibility in smoke and haze at Washington National Airport.** U. S. Weather Bureau, [1947?]. 4+leaves. map, 3 tables. Mimeographed. **DWB**—The main source of smoke pollution, which obscures visibility at the Washington National Airport, is the railroad yards near Alexandria, Va. Data for 4 winters are summarized and studied with regard to whether or not there was a radiation inversion, as evidenced by RAOBS made at the Airport. No relation was found, but there was a marked relation with wind direction, especially at night. Daytime restriction to visibility did correlate with stability. A chart of surrounding topography and smoke sources is included. *Subject Headings:* **Atmospheric pollution, Visibility, National Airport, Washington, D. C.**—*M.R.*

2.8–163 551.591.1

Boldyrev, N. C., **Dal'nost' vidimosti real'nykh ob'ektov.** [Range of visibility of actual objects.] *Leningrad, Glavnaia Geofizicheskaia Observatoriia, Trudy*, 19(81):14–24, **1950.** 6 tables, 4 refs., 10+equations. **DLC**—The author analyses the conditions of visibility of actual objects, basically determined by the transparency of the atmosphere (meteorological visibility) and the condition of perceptibility of objects against their background, depending upon the contrast in their brightness and the distance from the observer. The article contains formulas for computation of both kinds of visibility and of their interrelation, and a nomogram of the range of daylight visibility, constructed by the author in 1946. *Subject Headings:* **Visibility measurement, Atmospheric transparency.**—*C.K.*

ATMOSPHERIC ELECTRICITY

2.8–164 551.594.11:551.21

Hatakeyama, H. and Utikawa, K., **On the disturbance of the atmospheric potential gradient caused by the eruption smoke of the volcano Aso.** *Meteorological Society of Japan*,

Journal, 2nd Ser., 28(12):456–462, Dec. **1950.** 4 figs., 2 tables. In Japanese, English summary p. 462. **MH-BH**—The disturbance of the potential gradient was positive near the crater when ashes were falling, but was negative for a short time when only the upper tip of the smoke cloud was overhead. In the laboratory it was found that mutual collision electrified the larger ash particles positively and the smaller ones negatively. *Subject Headings:* **Potential gradient, Volcanoes.**—*C.E.P.B.*

2.8–165 551.594.11

Israël, Hans, **Das luftelektrische Potentialgefälle in Buchau a. F.** [Atmospheric electric potential gradient in Buchau am Federsee.] *Annalen der Meteorologie*, 3(11–12):329–332, **1950.** 3 figs., table, 6 refs. **MH-BH**—Describes observations in a situation remote from urban effects. Monthly means of hourly values are given Nov. 1947–Oct. 1948. The double oscillation is strongly shown in summer and is unexpected. It is clearer in continental than in polar maritime air. Trains passing 70 meters away cause a sudden large increase. *Subject Heading:* **Potential gradient.**—*C.E.P.B.*

2.8–166 551.594.11

Paramonov, N. A., **O godovom khode gradienta atmosferno-elektricheskogo potentsiala.** [On the annual march of the atmospheric potential gradient.] *Akademiia Nauk, SSSR, Doklady*, 71(1):39–40, March **1950. DLC**—Curves of annual variation (V′) in potential gradient for the Northern Hemisphere (45 points), the Southern Hemisphere (15 points), the mean for both hemispheres, and for the oceans (based on Carnegie Institute data, 1926) show a similarity in phase, although a varying amplitude. The maximum occurs in northern winter, the minimum in northern summer. The amplitude varies by 48% in the Northern Hemisphere and −16% in the Southern (average 32%). Probable cause of simultaneous variation of V′ for both hemispheres is ascribed to the annual variation in charge of the earth's surface due to uneven seasonal thunderstorm and rainfall activity over the two hemispheres. *Subject Heading:* **Potential gradient.**—*M.R.*

2.8–167 551.594.12

Bricard, J., **L'équilibre ionique de la basse atmosphère.** [Ionic equilibrium of the lower atmosphere.] *Journal of Geophysical Research*, 54(1):39–52, March **1949.** table, 21 refs., 22 equations. French and English summaries p. 39. **MH-BH**—A mathematical discussion of the effect of diffusion and ion mobility on the electrical characteristics of the atmosphere. The decrease in the ratio of large to small ions from summer to winter at Chambon corresponds to an increase in size of nuclei with increasing relative humidity, and this agrees with author's theory. *Subject Heading:* **Ionization.**—*C.E.P.B.*

2.8–168 551.594.12:551.510.53

Massey, H. S. W., **Some problems of the upper atmosphere.** *Commission pour l'Étude des Relations entre les Phénomènes Solaires et Terrestres, Sixième rapport*, Orléans, France, p. 176–179, **1948.** 14 refs., 2 equations. **MH-BH**—Brief discussion of problems of formation of ionized layers and origin of light of night sky. *Subject Headings:* **Ionization, Upper atmosphere, Light of the night sky.**

2.8–169 551.594.21:551.594.13

Gish, O. H. and Wait, G. H., **Thunderstorms and the earth's general electrification.** *Journal of Geophysical Research*, 55(4):473–484, Dec. **1950.** 7 figs., table, 13 refs. **MH-BH**—An attempt was made to determine whether the net current from a typical thunderstorm to the earth has the sign and magnitude required to maintain the general negative surface charge of the earth. An airplane equipped with instruments for recording data necessary for determining atmospheric electrical conductivity and the vertical component of electrical field strength was flown above the tops of 21 thunderstorms in the United States. The vertical current density was computed from values of total atmospheric conductivity and vertical field strength. The means for both positive ($\lambda+$) and negative ($\lambda-$) conductivity plotted against altitude squares (h^2) are represented by the equation $\lambda=\lambda+Ah^2$. In higher range of altitudes $\lambda-$ was usually greater than $\lambda+$. Electric field profile corresponds to that of a

bipolar model with + pole upward: example of electric field profile is given. All values of total current were positive, indicating that charge transported from thunderstorm to earth is negative. For I equal to 0.5 amp. N should be 3600. It is concluded that thunderstorms supply the negative charge to the earth. *Subject Headings:* **Thunderstorm electricity, Atmospheric conductivity.**—*I.L.D.*

2.8–170 551.594.21

Saha, N. K., **On Frenkel's theory of the origin of atmospheric electricity.** *India, National Institute of Sciences, Proceedings*, 15(7):277–281, Sept.–Oct. **1949.** 6 refs., 7 equations. **DBS, DLC**—The electrification of water drops is discussed on the basis of Frenkel's theory that it originates: 1) in the ionization of air by cosmic rays and ultraviolet radiation and 2) stronger affinity of water drops or ice crystals for absorption of negative than positive ions. The electric fields in a thundercloud and near the earth's surface are then treated and the conclusion reached that the mechanism proposed by FRENKEL holds good for the initial stages of cloud formation, but that after it becomes a real thundercloud the Frenkel theory no longer holds. *Subject Headings:* **Thunderstorm electricity, Frenkel's theory.**—*M.R.*

2.8–171 551.594.6

Budden, K. G., **I. The propagation of a radio-atmospheric.** *Philosophical Magazine*, Ser. 7, 42(324):1–19, Jan. **1951.** 7 figs., 15 refs., 10 equations, 2 append. **DLC**—The propagation of *sferics* depends on the nature of the boundaries of the wave-guide. Since the ionosphere is an imperfect conductor, the distance critical frequency and other properties of transmission will vary and the impulses will be distorted at great distances from the source. It is shown that the nature of the source is not important. The model worked out in this paper is idealized and shows the fractional reduction in intensity at 1000 km. for various frequencies, and the wave form and other features for long waves. *Subject Heading:* **Sferics.**—*M.R.*

2.8–172 551.594.6

Yabsley, D. E., **Atmospheric noise levels at radio frequencies near Darwin, Australia.** *Australian Journal of Scientific Research, Ser. A, Physical Sciences*, 3(3):409–416, Sept. **1950.** 5 figs., 4 refs. **DWB**—The record of atmospheric radio noise at a frequency of 1.93 Mc./s. obtained near Darwin, Australia, between Aug. 1944 and Oct. 1945 is described and analyzed. Some measurements were made at a frequency of 5.9 Mc./s. The noise measuring equipment and noise measuring program are described and the specifications and interpretation of measured noise levels are discussed. The results obtained are presented in graphs. *Subject Heading:* **Sferics.**—*I.L.D.*

2.8–173 551.594.7:523.74

Stranz, Dietrich, **Ergebnis einer Fade-out-Statistik.** [Results of fade out statistics.] *Archiv der elektrischen Übertragung*, 4:217–218, [**1950**]. 7 refs. Reprint available. **MH-BH**—Distribution of spots about central meridian of sun on days with total fading and without fading at Göteborg compared for Aug.–Dec. 1948. This showed a significant rarity of spots near central meridian on days without fading. *Subject Headings:* **Radio fading, Sunspots.**—*C.E.P.B.*

2.8–174 551.594.7:551.510.52

Davies, H., **A preliminary study of some results from the radio-meteorological investigation conducted in Canterbury.** Sixth New Zealand Science Congress 1947, Report. *Royal Society of New Zealand, Transactions*, 77(5):78–85, Nov. **1949.** 10 figs. **DLC**—The mechanics of orthodox propagation of cm. waves in a well mixed atmosphere are discussed, including lobe distribution above the horizon due to interference of direct and reflected rays. Anomalous propagation in a duct is considered and the effect of a land-sea transition on the vertical structure of potential temperature, specific humidity, modified refractive index and duct shape in a typical NW advective duct are illustrated. These cause considerable superrefraction of wave-lengths of 3 and 10 cm. *Subject Headings:* **Radio meteorology, Radio transmission ducts.**—*C.E.P.B.*

COSMIC PHENOMENA

2.8–175 523:551.501.9

*Öhman, Yngve, **On the solar work of the Stockholm Observatory.** *Tellus*, 2(4):255–261, Nov. **1950.** 3 figs., 2 tables. **MH-BH**—A brief report of work done since 1947 at the Stockholm Observatory. The work consisted mainly in photography of sunspots and faculae, chromospheric flares, prominences, etc. and in making reports and forecasts twice a week for use at Swedish institutions. Special, but simple, equipment and methods of observation are described. Work is especially valuable since the observatory is in the zone of auroral activity. *Subject Headings:* **Solar research, Stockholm Observatory.**—*M.R.*

2.8–176 551.5:523.42

Rubashev, B. M., **Novye dannye o fizicheskikh usloviiakh na Venere.** [New findings regarding physical conditions on Venus.] *Priroda*, Moscow, 39 (11):37–38, Nov. **1950.** 7 refs. **DLC**—Among the big planets of the solar system, Venus is the least explored with the exception of Pluto and possibly of Neptune. The reason is that the atmosphere of Venus is almost opaque for visible rays; attempts to make photographs of the surface of Venus have failed. Only by the use of light-filters was the non-uniformity of the cloud cover of Venus revealed. Recent observations by N. P. Barabashev and V. I. Ezerskiĭ led to some conclusions about physical conditions on Venus, from which the author of the article considers one as more or less substantiated, namely, that toward the end of the day the amount of dust in Venus' atmosphere increases considerably. *Subject Headings:* **Planetary atmospheres, Venus.**—*C.K.*

2.8–177 523.43

Lohmann, Werner, **Neuere Marsforschungen.** [Recent investigations of Mars.] *Naturwissenschaftliche Rundschau*, 3(4):156–161, April **1950.** 3 figs., 2 refs. **DA**—The author summarizes information on the climate and atmosphere of Mars, obtained with the aid of modern astrophysical methods. The density and constitution of the atmosphere—the presence of water vapor, carbon dioxide, oxygen and ozone—and the possibility of the existence of plant life under the atmospheric conditions of Mars are discussed. *Subject Headings:* **Planetary atmospheres, Mars.**—*I.L.D.*

2.8–178 523.7

Abetti, Giorgio, **Solar meteorology.** *Commission pour l'Étude des Relations entre les Phénomènes Solaires et Terrestres, Sixième rapport*, Orléans, France, p. 201–207, **1948.** 2 plates, 8 refs. **MH-BH**—Description of visual and spectroscopic methods of examining solar phenomena. *Subject Heading:* **Solar phenomena.**—*C.E.P.B.*

2.8–179 523.7

Mine, Eiji, **Researches on the limb darkening of the sun by the observation of annular eclipse.** *Meteorological Society of Japan, Journal, 2nd Ser.*, 28(11):404–407, Nov. **1950.** table, equations. In Japanese, English summary p. 406–407. **MH-BH**—Observations on 5000 Å with a solarimeter gave at distances $r=0-.95$ of sun's radius from center, $I=Io(1-U+U\sqrt{1-r^2})$ $U=1/5$. From $r=.95-1$ (region of convective equilibrium) $I=Io(1-r^2)$. $2(C-1)/C$, $C=5/3$. *Subject Heading:* **Solar radiation.**—*C.E.P.B.*

2.8–180 523.74

Schove, D. Justin, **Sunspot epochs 188 A.D. to 1610 A.D.** *Popular Astronomy*, 61(5), May **1948.** 6 p. 2 figs., table, 10 refs. Reprint available. **MH-BH**—From observations of sunspots and auroras since A.D. 188 author finds that since 800, years whose last two digits are exactly divisible by 11 (e.g. 1733) are approximately years of sunspot minimum; before 800 of sunspot maximum. The mean cycle is almost exactly 11.1 years. *Subject Heading:* **Sunspot cycle.**—*C.E.P.B.*

2.8–181 523.8

Keenan, P. C. and Hynek, J. A., **Neutral oxygen in stellar atmospheres.** *Astrophysical Journal*, 111(1):1–10, Jan. **1950.** 4 figs., 4 tables, 17 refs. **DLC**—Total absorptions of the

lines of O_I at λ7774 and λ8446 have been determined from the spectrograms of 56 stars. An analysis of the variation of the oxygen lines indicates that these increase rapidly through the later subdivisions of type B to rather flat maximum in type A. The intensities decline more slowly through type F and disappear in type G. The line λ7774 is very sensitive to absolute magnitude and, from B5 to G2, forms one of the most striking of the luminosity criteria for the separation of supergiants from other stars. The relative abundance of oxygen and hydrogen for the stars αCMa, αCMi, αPer, σCyg and δSMa is presented in a table. In these atmospheres the mean ratio is about one oxygen atom to every thousand hydrogen atoms. The tendency of the triplet lines, λ8446 to go into emission more readily than do the quintet lines λ7774 is explained by the coincidence of the O_I triplet 1025.77 with Lymon-β; hence any departure from the normal absorption ratio of about 0.6 for 8446/7774 indicates ultraviolet emission in Lymon-β. *Subject Heading:* **Stellar atmospheres.**—*From author's abstract.*

OCEANOGRAPHY

2.8–182 551.46:92

Andreeva, Ekaterina V., **IU. M. Shokal'skiĭ; okeanograf, meteorolog, geograf.** [IU. M. Shokal'skiĭ; oceanographer, meteorologist, geographer.] Leningrad, Gidromet. Izdat., **1950.** 53+p. 4 photos. **DLC**—A brief popular biographical sketch stressing SHOKAL'SKIĬ's oceanographic investigations. *Subject Headings:* **Oceanography, Biography, IU. M. Shokal'skiĭ.**

2.8–183 551.5:551.46:532.59

Forrest, D. R., **A method of estimating wave direction.** *U. S. Army Corps of Engineers, Beach Erosion Board, Bulletin,* 4(2):31–37, April **1950.** 6 figs. **DGS**—In making wave period, height and direction observations at San Diego, Cal., it was found that accurate measurements of wave direction could not be made with a transit telescope. A sighting bar, attached to the transit, enables the observer to follow a wave crest more readily and, with certain limitations, to obtain direction of movement within 5 or 6 degrees. *Subject Headings:* **Wave observations, Marine meteorology, California.**—*M.R.*

2.8–184 551.46

Hidaka, Koji, **Mass transport in convection currents and the lateral mixing.** *Oceanographical Magazine,* Tokyo, 1(4):175–184, Dec. **1949.** 7 figs., table, 4 refs., 11 equations. In English. **MH-BH**—The actual and theoretical circulation in the North Pacific are considered. When horizontal mixing is intense, the stream lines approach the isobars, but when the mixing is weak, there is considerable difference. A much larger coefficient of lateral mixing than that actually found must be used to make the theoretical circulation pattern agree with the actual. *Subject Headings:* **Ocean currents, North Pacific Ocean.**—*M.R.*

2.8–185 551.46

Klenova, M. V., **Geologiia moria.** [Geology of the seas.] Moscow, Gosizdat., **1948.** 495 p. 250 figs., tables, biblio. p. 470–481. **DLC**—After a brief discussion of the history of oceanography and hydrography, the subject of marine geology is treated in a detailed and scholarly manner. The main chapters deal with submarine geology, chemical composition of sea water, marine precipitates and bottom sediments, deltas, beaches and beach erosion and the history of the oceans and seas. Applications to or from meteorology are numerous: effect of rainfall or melting ice on salinity of oceans; variations in rainfall and evaporation affecting extent or salinity of seas like the Black and Caspian; climatic changes affecting extent of oceans or seas and so on. *Subject Headings:* **Geology, Oceanography, Textbooks.**—*M.R.*

2.8–186 551.46:37

Pickard, G. L. and Cameron, W. M., **The Institute of Oceanography, University of British Columbia.** *American Geophysical Union, Transactions,* 32(1):112–113, Feb. **1951. MH-BH**—A description of the laboratories and the problems being investigated at the new Oceanographic Institute in Vancouver B. C. Facilities for field work are available at Esquimalt and Nanaimo,

B. C. Two research vessels are maintained by the Royal Canadian Navy. Fields of study include the interests of the physical, chemical, ecological, meteorological and fisheries specialists. *Subject Headings:* **Oceanographic institutes, British Columbia.**—*M.R.*

2.8–187 551.46(266.5)

Tully, John P., **Review of Canadian Pacific oceanography since 1938.** *American Geophysical Union, Transactions*, 30(6):891–893, Dec. **1949.** **DWB**—Discusses: the influence and limits of the Fraser River in the sea; the Alberni project for disposal of waste from a sulfite mill by river discharge into Alberni Inlet; the Chatham project (salmon fishery) and Lighthouse project for daily observations of sea temperature and salinity. *Subject Headings:* **Oceanography, Canadian Pacific Coast.**—*C.E.P.B.*

2.8–188 551.461.2

Munk, Walter H., **Surf beats.** *American Geophysical Union, Transactions*, 30(6):849–854, Dec. **1949.** 4 figs., 2 tables, 7 refs. **DWB**—Discusses records obtained with a tsunami recorder (period 2–3 min.) 1000 ft. off shore at La Jolla and a swell recorder (period 7–9 sec.) 2000 ft. off shore. Tsunamis are irregular oscillations around 2 min. period due to groups of waves integrated on shore and reflected. Their amplitude averages 1/11 that of swell. *Subject Heading:* **Surf beats.**—*C.E.P.B.*

2.8–189 551.465

Haurwitz, B. and Panofsky, H. A., **Stability and meandering of the Gulf Stream.** *American Geophysical Union, Transactions*, 31(5), Pt. 1:723–731, Oct. **1950.** 8 figs., table, 8 refs., 9 equations. **MH-BH**—The position of the Gulf Stream and especially of the shear zone on the landward side, vary greatly. The boundary shows an unstable wave motion which is examined by four models. *Subject Headings:* **Ocean currents, Gulf Stream.**—*C.E.P.B.*

2.8–190 551.465:532.59

Munk, Walter H., Groves, G. W. and Carrier, G. F., **Note on the dynamics of the Gulf Stream.** *Journal of Marine Research*, 9(3):218–238, **1950.** 7 figs., 8 refs., 32 equations. **DWB**—Using the notations of MUNK (1950), the equations of motion are solved for mass transport in a wind driven ocean circulation. The case of north-south boundaries and constant depth of thermocline is taken up by means of successive approximation and then the cases of an inclined boundary and of a variable thermocline depth are treated. It is assumed that the boundaries are sharply defined and that the coast line is regular. The countercurrent inshore and the continued sharpness of the western boundary, after leaving the continental shelf, cannot be explained. *Subject Headings:* **Hydrodynamics, Gulf Stream.**—*M.R.*

2.8–191 551.465

Saito, Y., **One problem of the stationary drift-circulative current in a polytropic ocean.** *Meteorological Society of Japan, Journal, 2nd Ser.*, 28(2):35–61, Feb. **1950.** 2 figs., 70 equations. In Japanese, English summary p. 61. **DWB**—Author analyzes the drift current in a polytropic ocean in a bounded rotating canal, taking account of the horizontal and vertical kinematic velocities. *Subject Heading:* **Ocean currents.**—*C.E.P.B.*

PART II. SELECTIVE ANNOTATED BIBLIOGRAPHY ON RADAR AS APPLIED TO METEOROLOGY

By: *Wilhelm Nupen*

EXPLANATORY NOTE

In this bibliography subject matter has been limited to that which concerns applications of *radar* or microwave equipment to observation of meteorological elements, excluding most articles which deal with the applications of *meteorology* to microwave (radio or radar) transmission or to applications of microwave techniques to sounding of the ionosphere or stratosphere. A few articles may be included which incidentally cover some of these phases of this broad subject, but the largest number is being withheld for publication in a later bibliography. Similarly, articles which deal with "sferics" are only included if incidentally pertinent to the subject of this bibliography. The majority of "sferics" studies will be published later.

The entries are arranged in chronological order (by year) and alphabetical order by authors, within each year. The outline of contents will serve as a more detailed guide to the scope of the material included.

The terminology used in this bibliography has been made to conform with popular usage, in keeping with the principle that subject headings and titles should follow the most common usage (i.e., a subject should be indexed under that term which would come most readily to the minds of the majority of people searching for material on the subject). Hence, when dealing with the construction or use of Radar equipment in meteorological observations, the popular term **Radar** has been used. When dealing with propagation through atmospheric ducts or the ionosphere, the term **Microwave** has been and will be used, since that is the term in most common usage among radio propagation and ionospheric research personnel.

We wish to express appreciation for special assistance rendered by Alan Bemis and Myron Ligda of the Weather Radar Research Div., Dept. of Meteorology, Massachusetts Institute of Technology, to C. F. Brooks of Blue Hill Observatory and to Robert Stone of the U. S. Air Weather Service.

OUTLINE OF CONTENTS

Radar (microwave) echoes from
- Atmosphere, 2H–12, –45, –51, –79, –82, –86, –115, –132, –154
- Ionization bands, 2H–3, –7
- Ionosphere, 2H–2, –4 to –6, –42, –73, –143, –182, –212
  - E layer (Kennely-Heaviside), 2H–2, –4 to –6, –63, –73, –173
  - E1 layer, 2H–42
  - E2 layer, 2H–42, –212
- Troposphere, 2H–15, –18, –19, –22, –43, –106
- Precipitation, 2H–15, –22, –33, –35, –62, –69, –71, –79, –83, –84, –86, –90, –91, –97, –99, –101, –102, –105, –110, –112, –114, –126, –135, –142, –145, –146, –151, –154, –161, –163, –165, –169, –180, –196, –206, –209, –210, –215, –217, –219 to –221, –232
  - Ice crystals, 2H–69, –162, –175, –179, –206
  - Precipitation cells, 2H–69, –79, –112, –135, –142, –174
  - Rainfall, 2H–15, –22, –33, –35, –45, –51, –62, –64, –74, –81, –83, –87, –95, –96, –101, –114, –120, –124, –131, –146, –150, –156, –164, –175, –176, –180, –188, –191, –201, –202, –207, –209, –210, –213, –215, –217, –219, –220, –228, –230, –232
  - Snow, 2H–35, –74, –97, –155, –161, –176, –206, –215
- Storms, 2H–10, –18, –23, –24, –52, –82, –108, –112, –119, –176, –223, –224, –230
  - Hurricanes, 2H–45, –58, –90, –96, –138, –168, –193, –229
  - Storm cells, 2H–37, –79, –145, –158, –159, –174, –191
  - Thunderstorms, 2H–10, –13 to –15, –18, –23, –28, –30, –32, –33, –35, –37, –45, –56 to –58, –60, –70, –75, –88, –96, –99 to –102, –105, –108, –126, –128, –129, –139, –152, –158, –159, –174, –181, –183, –184, –188, –189, –205, –210
  - Tornadoes, 2H–153, –197
  - Typhoons, 2H–25, –45, –89, –90, –123, –194
- Various targets and/or obstacles, 2H–12, –95, –138, –222, –226
  - Birds, 2H–132
  - Fog, 2H–84
  - Icebergs, 2H–67
  - Insects, 2H–132
  - Meteors, 2H–29, –63, –73, –78, –113, –140, –173, –186
  - Moon, 2H–46, –133, –212
  - Sea, 2H–38, –51, –95, –166

Smoke, 2H–178
Air masses, 2H–22, –43, –87, –142, –163
Clouds, 2H–25, –51, –66, –69, –84, –90, –102, –111, –116, –122, –131, –134, –149, –158, –170, –178, –183, –192, –196, –226
Fronts, 2H–18, –25, –33, –45, –91, –92, –96, –112, –142, –179, –189, –191
Inversions, 2H–43, –190
Shadow zones, 2H–22
Echo Phenomena
Banded structures, 2H–90, –169
Bright band, 2H–69, –71, –126, –149, –155, –161, –162, –175, –188, –204, –206, –213
"Dot" echoes, 2H–106
"False" echoes, 2H–22, –150, –198, –211, –216
Fading, 2H–182, –212, –216
Masking, 2H–22, –111, –164, –220
Reflection, 2H–3, –7, –38, –40, –43, –95, –111, –166, –195, –202, –222
Radar Equipment, 2H–2, –17, –21, –24, –26 to –28, –30, –36, –37, –39, –40, –41, –43, –46, –48, –50, –52, –54, –58, –66, –67, –73, –76, –77, –81, –85, –86, –94, –99, –102 to –105, –107 to –109, –110, –112, –115 to –117, –119, –121, –122, –124, –133, –139, –141, –149, –152, –154, –160, –164, –168, –170 to –172, –192, –201, –203, –211, –214, –225, –227, –228, –231
AN/APS-2F, 2H–87
AN/APS-15, 2H–87
AN/CRD-1, 2H–109
AN/TPS-10A, 2H–65, –146
"ANTI-CLUTTER," 2H–95
Cloud base and top indicator, 2H–134
Cloud detector, 2H–192
CPS-9, 2H–145
ECKO, 2H–167, –170
L-Band, 2H–149
LORAN, 2H–54, –101
Marine, 2H–164
RADAR-sonde, 2H–50, –57, –147, –225
RASAPH, 2H–135, –203
S-Band, 2H–149
SCR, 2H–39, –57, –129, –135, –145, –146, –170, –184, –196, –197, –205
SHORAN, 2H–54
SODAR, 2H–43
TELERAN, 2H–44
TPS-10, 2H–65, –145
X-Band, 2H–125
Radio Communication, 2H–18, –107, –182
Radio Equipment, 2H–2, –5, –6, –8 to –11, –13, –14, –27, –28, –52, –54, –59, –60, –78, –130, –186
Direction finders, 2H–9, –11, –108, –109
Kreusi Loop, 2H–8
Radio Propagation, 2H–3, –15, –16, –40, –46, –51, –55, –61 to –64, –70, –75, –83, –84, –87, –93, –107, –125, –133, –146, –163, –185, –190, –220
Radio Transmission, 2H–3 to –6, –18, –21, –46, –62, –63, –185
Radio transmission ducts, 2H–190
Bibliographies, 2H–47, –49, –187
Definitions, 2H–54, –203
History of Radar, 2H–21, –55
Manuals, 2H–17, –94, –121, –141, –218
Nomographs, 2H–97, –165
Radar Photographs, 2H–12, –25, –30, –33, –35, –36, –45, –46, –56, –58, –64, –65, –69 to –72, –77, –79, –82, –85, –87 to –93, –97, –100, –102, –103, –106, –112, –113, –123, –129, –138, –140, –145, –150, –151, –155, –159, –160, –168, –169, –174, –176, –178 to –181, –183, –196, –197, –199, –204, –213, –214, –221, –224
Drop Size Distribution, 2H–35, –62, –64, –87, –90, –91, –101, –110, –114, –120, –124, –125, –144, –175, –209, –210, –219
Drop Size Measurements, 2H–35, –62, –64, –87, –90, –110, –114, –120, –142, –144, –175, –201, –209, –210, –219
Forecasting, 2H–10, –13, –15 to –17, –24, –26, –33, –36, –42, –44, –50, –77, –85, –88, –96, –104, –109, –150, –153, –160, –176, –189, –193, –213, –217, –226, –229
Sferics, 2H–1, –9 to –11, –13, –14, –18, –23, –50, –52, –59, –60, –75, –96, –108, –153, –158, –184, –185
Turbulence, 2H–88, –105, –116, –122, –152, –188, –192, –199, –208, –226
Vapor Pressure, 2H–16
Wind Velocity, 2H–35, –45, –67, –143, –186

BIBLIOGRAPHY ON RADAR AS APPLIED TO METEOROLOGY

1923

2H–1 551.501.83

*Watson-Watt, Sir Robert A., **Directional observations of atmospherics 1916–1920.** *Philosophical Magazine*, London, 45(269):1010–1026, May **1923.** 4 figs., 2 tables. **DLC**—A statistical analysis of the 1300 bearings of atmospherics taken between 1916–1920 by six British coastal direction finding stations. *Subject Headings:* **Sferics, England.**

1928

2H–2 551.508.85:621.396.826

Tuve, M. A. and Dahl, O., **A transmitter modulating device for the study of the Kennelly-Heaviside layer by the echo method.** *Institute of Radio Engineers, Proceedings*, 16(6):794–798, June **1928.** 3 figs., 3 refs. **DLC**—A method for modulating the transmitter, based upon the sudden

pulses of plate current occurring in an unbalanced multivibrator circuit, is described briefly. *Subject Headings:* **Radio equipment, Radio echoes, K-H layer.**

1929

2H–3 551.501.8:621.396.836

Breit, G., **Group-velocity and long retardations of radio echoes.** *Institute of Radio Engineers, Proceedings*, 17(9):1508–1512, Sept. **1929.** 2 figs., table, 3 refs., 5 equations. **DLC**—Up to 15 sec. retardations of echoes have been observed by STÖRMER and by VAN DER POL. VAN DER POL's theory that group-velocity may account for STÖRMER's long retardation observation is discussed. Author suggests that STÖRMER's and VAN DER POL's observations were splashes of the very same echo focused accidentally on a favorable patch of ground. *Subject Headings:* **Ionization band echoes, Reflection echoes.**

2H–4 551.501.8:621.396:836

Breit, G., **The significance of observations of the phase of radio echoes.** *Institute of Radio Engineers, Proceedings*, 17(10):1815–1821, Oct. **1929.** 8 refs., 14 equations. **DLC**—The method of observing echoes, developed by TUVE and HAFSTAD, is discussed in order to show to what extent the phase can be expected to be constant throughout the echo if the frequency-dispersion of the K-H layer is taken into account. *Subject Headings:* **Radio echoes, K-H layer.**

2H–5 551.510.535:621.396.826

*Hafstad, L. R. and Tuve, M. A., **Further studies of the Kennelly-Heaviside layer by the echo-method.** *Institute of Radio Engineers, Proceedings*, 17(9):1513–1522, Sept. **1929.** 10 figs., table, 6 refs. **DLC**—The results of experiments with multivibrator modulation are discussed. Two 24-hour series of observations showed a distinct diurnal variation in the height of the layer. Daytime heights, during a number of autumn days in 1928, are given. *Subject Headings:* **Radio observation, Radio echoes, K-H layer, Radio equipment.**

2H–6 551.501.8:621.396.826

Mirick, C. B. and Hentschel, E. R., **A new method of determining height of the Kennelly-Heaviside layer.** *Institute of Radio Engineers, Proceedings*, 17(6):1034–1041, June **1929.** 13 figs., table, 4 refs., 2 equations. **DLC**—Radio signals, transmitted by airplanes in flight, are recorded graphically on a moving chart to show periodic variations of frequency over considerable time intervals. By connecting this frequency with the distance of transmission, the ground speed of the aeroplane and the effective height of the K-H layer, a theory is evolved by which the height of the K-H layer is computed. *Subject Headings:* **Radio echoes, K-H layer.**

2H–7 551.501.8:621.396.826

*†Pedersen, P. O., **Wireless echoes of long delay.** *Institute of Radio Engineers, Proceedings*, 17(10):1750–1785, Oct. **1929.** 12 figs., 4 tables, numerous refs. and equations. **DLG**—Short radio waves, λ = about 31 m., of which the echoes were delayed by 3 min. 15 sec. and 4 min. 20 sec., have been observed by JØRGEN HALS, STÖRMER, VAN DER POL and others. Author is of the opinion that these long delayed echoes are reflections from ionization bands outside the influence of the earth's magnetic field. *Subject Headings:* **Radio observation, Ionization band echoes.**

1935

2H–8 551.508.85:629.13

Harrison, H. T., Jr., **Progress against adverse flying weather.** *American Meteorological Society, Bulletin*, 16(8–9):206, Aug.–Sept. **1935.** 3 tables. **MH-BH, DLC**—Author summarizes the present situation and predicts future progress. A radio device for blind landing known as Kreusi Loop is mentioned. *Subject Headings:* **Visibility, Radio equipment, Kreusi Loop.**

2H–9 551.501.83:551.508.85(71)

*Henderson, J. T., **Direction finding of atmospherics.** *Canadian Journal of Research*, 13, (2):34–44, Aug. **1935.** 3 figs., table, 6 refs. **DLC**—Description of observations of a cathode ray direction finder. *Subject Headings:* **Sferics, Radio equipment, Canada.**

2H–10 551.501.83:551.509.5:551.515.4

Hutchins, Kennan M., **Radio static forecasts thunderstorms.** *American Meteorological Society, Bulletin*, 16(3):74–75, March **1935.** **DLC**—Observations over several summers show that radio is a useful aid in forecasting thunderstorms. *Subject Headings:* **Radar storm detection, Thunderstorms, Radio echoes, Sferics.**

1936

2H–11 551.508.85:621.396.821

Bent, Arthur E., **Some recent papers on radio atmospherics and direction finding.** *American Meteorological Society, Bulletin*, 17(3):75–78, March **1936.** 10 refs. **DLC, MH-BH**—A review (radiogoniometry). *Subject Headings:* **Radio equipment, Sferics.**

1943

2H–12 551.501.8

Bent, Arthur E., **Radar echoes from atmospheric phenomena.** *Massachusetts Institute of Technology, Radiation Laboratory, Report* No. 173, March 13, **1943.** 10 p. 5 figs. **DWB**—Various types of echoes are discussed, and those related to meteorological phenomena are described and illustrated. *Subject Heading:* **Radar echoes.**

2H–13 551.501.83:551.515.4

Forrest, J. S., **The determination of the location and frequency of thunderstorms by a radio method.** *Royal Meteorological Society, Quarterly Journal*, 69:33–46, Jan. **1943.** 9 figs., 2 tables, 9 refs. **DLC**—A method of continuously recording atmospherics in order to obtain warning of the outbreak of a thunderstorm and to determine the distance of the storm from the recording site is described. Results of three years' experience with this technique are given. The relation between the recorder output and the storm distance has been determined by correlating the output recorder deflections with the known locations of electric power system breakdowns due to lightning. Statistical data on the frequency of thunderstorms and details of diurnal variations in the intensity of atmospherics in the south of England are given. (*Same abstract* as No. H–122 in Aug. 1950 *Meteorological Abstracts.*) *Subject Headings:* **Radar storm detection, Sferics, Radio echoes.**—*From author's abstract.*

2H–14 551.501.83:551.515.4

Forrest, J. S., **Tracing thunderstorms; a use for atmospherics.** *Wireless World*, 49(7):192–194, July **1943.** 3 figs. **DLC**—A summary of direction finding methods for locating thunderstorms by means of atmospherics. A rectifier type, moving-coil pen-recorder is used and described. *Subject Headings:* **Radar storm detection, Thunderstorms, Sferics, Radio equipment.**

1944

2H–15 551.594.72:551.501.81

*Bent, Arthur E., **Climate in relation to microwave radar propagation in Panama.** *Massachusetts Institute of Technology, Radiation Laboratory, Report* No. 476, Feb. 25, **1944.** 28 leaves. 11 figs., 3 tables. **MCM**—"Climate and topography in Panama result in four distinct radar propagation regions. Precipitation echoes caused by heavy tropical rain are most frequent from May to December and over the mountains of the interior. Showers and thunderstorms are detected at ranges of 100 miles. More precipitation areas are observed over the Atlantic Ocean than over the Pacific. A procedure for locating precipitation areas by radar and reporting to the local Weather Service . . . was established in the region." *Subject Headings:* **Radar propagation, Radar storm detection, Radar echoes, Precipitation, Thunderstorms.**—*From author's abstract.*

2H–16 551.594.72:551.501.8

*†Katz, Isadore and Austin, J. M., **Qualitative survey of meteorological factors affecting microwave propagation.** *Massachusetts Institute of Technology, Radiation Laboratory, Report* No. 488, June 1, **1944.** 50 p. 17 figs., 14 tables, 13 refs. **MCM**—An introduction to radio-meteorology, stressing the forecasting of the distribution of the modified index of refraction. Dependence of modified index curve on vapor pressure and temperature gradient is discussed. The types of index curves, which are classified into six categories, are discussed in detail. *Subject Headings:* **Radar propagation, Radar observation.**

2H–17 551.501.8:551.509.5(02)

Preliminary instruction manual weather forecasting for radar operations. *U. S. Air Weather Service, Technical Report* 101–1, March **1944.** 61 p. 28 figs. **DWB**—A manual to facilitate cooperation between weather and radar personnel. The use of meteorological forecasts to utilize the maximum efficiency of the radar set is discussed. *Subject Headings:* **Radar observation, Radar equipment, Manuals.**

2H–18 621.396:551.509.34:551.594.6

*§Schindelhauer, F. and Israël, Hans, **Die Peilung von Luftstörungen der drahtlosen Telegraphie zum Zwecke der Wettererkundung. (Arbeitsmethoden und bisherige Betriebserfahrungen.)**

[Location of atmospheric disturbances in radio transmission (sferics) for the purpose of weather forecasting. (Working methods and previous experiences.)] *Germany, Reichsamt für Wetterdienst, Forschungs- und Erfahrungsberichte, Ser. A*, No. 18, **1944.** 40 p. 45 figs., refs. **DWB**—Formerly secret. A comprehensive study of the methods for determining location of source of sferics and the frequency of thunderstorms over various regions within 1000 miles of France and Germany. The usefulness in reporting and forecasting fronts and storm areas is brought out by numerous examples of frontal charts made up just from radio-location data. *Subject Headings:* **Radio communication, Weather forecasting, Sferics, Thunderstorms, France, Germany.**—*M.R.*

2H–19 551.509.3:551.594.7

*§Smith, Dillon E., Fletcher, Robert D. and others, **Tropospheric weather factors likely to affect superfraction of VHF-SHF radio propagation as applied to the Tropical Western Pacific.** *U. S. Weather Bureau, Report* RP-1, July 1, **1944.** 100 p. 53 figs., equations, append. **DWB**—Purpose of this paper is to serve as a guide to forecasting radar transmission conditions in the Tropical Western Pacific. Computing methods for the M-curve, using aerological low-level sounding data, are given. *Subject Headings:* **Radar transmission forecasting, Tropical Western Pacific.**

2H–20 551.501.81:551.508.85(02)

†**Aircraft weather reconnaissance.** *U. S. Air Weather Service, Manual* 105–128–1, Sept. **1945.** 218 p. 24 figs., numerous tables, 47 refs., numerous equations, 11 append. **DWB**—The use of radar for determining wind at flight level. Indication of direction of ocean waves, obtained by means of airborne radar, provides information on surface wind direction when aircraft is in or above cloud. *Subject Headings:* **Radar storm detection, Radar equipment, Weather reconnaissance, Wind observation, Manuals.**

1945

2H–21 551.501.8(09)

Appleton, Sir Edward Victor, **The thirty-sixth Kelvin lecture: "The scientific principles of radiolocation."** *Institution of Electrical Engineers, Journal*, Pt. 1, 92(57):340–353, Sept. **1945.** 24 figs., 21 refs., 45 equations, append. **DLC**—Author gives a thorough explanation of "radio-location." Includes historical background, basic principles, recent applications, problems of microwave propagation and other related factors from the physicist's point of view. *Subject Headings:* **Radar theory, History of meteorology.**

2H–22 551.501.8:551.577

Bent, Arthur E., **Radar echoes from precipitation layers.** *Massachusetts Institute of Technology, Radiation Laboratory, Report* 689, Aug. 20, **1945.** 11 p. 7 figs. **DWB**—Radar echoes have been observed from discrete precipitation layers at the height of 1–2½ miles during general rain falling from moist, warm air masses. Author gives a detailed description of this type of echo which is very frequent in temperate latitudes but which is rather rare in the tropics where rainfall is largely convective. For example, it was observed once on an S-band system in Panama, when lifting of warm, moist air over mountains took place. Because the heavy rain echo may interfere with the radar detection of surface targets when the airplane is flying at the level of these reflective layers, it may be of operational significance to the radar personnel in special cases. *Subject Headings:* **Radar echoes, Precipitation, Moist air masses.**

2H–23 551.501.83:551.515.4:551.594.6

Bureau, Robert, **La localisation radioélectrique des orages.** [Radioelectric location of thunderstorms.] *La Météorologie*, 3rd Ser., Nos. 58–59–60, 149–162, July–Dec. **1945.** 4 figs., refs. **DWB**—The use of special goniometers for localizing thunderstorms is discussed. Registering of atmospherics is used to determine near and distant storms. Examples of method given. (*Same item* as No. H–149 in Aug. 1950 *Meteorological Abstracts.*) *Subject Headings:* **Radar storm detection, Thunderstorms, Radar observation, Sferics.**

2H–24 551.508.85:621.396.826

Eon, L. Guy, **Radar as an aid to air navigation and meteorology.** *Engineering Journal*, 28(11):690–694, Nov. **1945.** 7 figs. **DLC**—A nontechnical explanation of the principles of radar as applied to weather forecasting. *Subject Headings:* **Radar equipment, Radar echoes, Weather forecasting.**

2H–25 551.501.81:551.515

Kosco, George F., **Part I. Highlights of the December 1944 typhoon including photographic radar observations. Part II. A distant observation of a warm front including a photograph of cloud forms and slope of front.** *U. S. Navy Dept., Fleet Weather Central, Paper* No. 10, Feb. 10, **1945.**

2 p. 3 graphs, 7 photos.—Text accompanied by radar photographs. *Subject Headings:* **Radar storm detection, Radar echoes, Typhoons, Warm fronts, Radar photographs.**

2H–26 551.501.8:551.508.85:551.509.3

*§**Radar aids to weather forecasting.** *U. S. Navy Dept., Meteorological Branch, Memo* No. 133/45 (H.M. 45/45), March, **1945.** 5 p. 6 figs., 4 refs.—*Subject Headings:* **Radar observation, Radar equipment, Weather forecasting.**

2H–27 551.508.85:621.396.826

Smith, Rose L., **Radiolocation, principles and origins.** *Wireless World,* 51(2, 3):34, 66–70, Feb., March **1945.** 10 figs., 12 ref. **DLC**—An elementary introduction to the principles of radio location, comprising radar and some instrumental applications. *Subject Headings:* **Radar equipment, Radar echoes.**

1946

2H–28 551.501.81:551.508.85

Agenda of meeting of Thunderstorm Advisory Committee. U. S. Weather Bureau, Jan. **1946.** 3 p. **DWB**—Brief outline of the Thunderstorm Research procedure, including use of radar and other meteorological instruments. *Subject Headings:* **Radar storm detection, Radar equipment, Thunderstorms.**

2H–29 551.590.25:621.396

Appleton, Sir Edward Victor and Naismith, R., **Radar detection of meteor trails.** *Nature,* London, 158(4026):936–938, Dec. 28, **1946.** 3 figs., ref. **DLC**—During the night of 9–10 Oct. 1946, an unusual rise in the number of echoes occurred. Visual observations were not possible, but the shape of curve, giving rate of echo occurrence, agreed well with the visual ones observed during the last giacobinid shower in 1933. *Subject Headings:* **Radar echoes, Meteors, England.**

2H–30 551.508.85:551.515.4

Atlas, Davis, **Instrumentation of P-61B No. 43-8231 for TWA Thunderstorm Research Project.** *U. S. Air Weather Service, Memorandum Report* No. 33, Serial No. AWMET-14, July 9, **1946.** 27 leaves, 21 photos. Mimeographed. **DWB**—This report is an explanation of the instrumentation. *Subject Headings:* **Radar equipment, Thunderstorms.**

2H–31 551.501.81:551.508.85

†Bemis, Alan C. (comp.), **First technical report under Signal Corps Project.** *Massachusetts Institute of Technology, Dept. of Meteorology, Weather Radar Research, Technical Report No. 1,* Dec. 31, **1946.** 94 p. 31 figs., 2 tables, 64 refs., 26 equations. **DWB**—A general discussion of the present state of knowledge, instrumentation, techniques, etc. related to weather radar research and detailed description of the current program of research. *Subject Headings:* **Radar storm detection, Radar equipment.**

2H–32 551.501.81:551.514.4

†*[Bemis, Alan C. (comp.), **Weather Radar research.**] *Massachusetts Institute of Technology, Dept. of Meteorology, Progress Report,* Nos. 3–10, 12–14, **1946**–1949. [n. p.] numerous figs., refs., append. Mimeographed. (Signal Corps Contract No. W-36-039-sc-32038.) **DWB**—Reports on progress and observations on the Thunderstorm Project from July 1, 1946 through May 15, 1949. *Subject Headings:* **Radar storm detection, Thunderstorms.**

2H–33 551.501.8:551.577

Bent, Arthur E., **Radar detection of precipitation.** *Journal of Meteorology,* 3(3):78–84, Sept. **1946.** 12 photos, ref. **DWB**—An interesting article with excellent illustrations of radar echoes from thunderstorms, showers, cold and warm fronts. The echoes are classified and the meteorological radar equipment is described briefly. Suggestions on radar as a meteorological tool are presented. *Subject Headings:* **Radar storm detection, Radar echoes, Thunderstorms, Precipitation, Fronts.**

2H–34 551.5:621.396.11

Booker, H. G., **Elements of radio meteorology: How weather and climate cause unorthodox radar vision beyond the geometrical horizon.** *Institution of Electrical Engineers, Journal,* Pt. III A, 93(1):69–78, **1946.** Unchecked.—*Subject Headings:* **Radar equipment, Meteorological elements.**

2H–35 551.501.81:551.515.4

Brooks, Herbert B., **A summary of some radar thunderstorm observations.** *American Meteorological Society, Bulletin,* 27(10):557–569, Dec. **1946.** 10 figs., table, 6 refs. **DWB**—A very brief

statistical summary of characteristics of 300 thundershowers observed by radar at Spring Lake, N. J. during June–Aug. 1945. The radar observations indicate: 1) that most of the storms were detected at close range, and only the larger ones could be detected at extreme range, 2) snow and smaller raindrops gave a weaker echo than larger drops and 3) correlation between thunderstorm occurrence, surface winds, and winds at 5000 ft. at 1000 local standard time, but surprisingly little correlation with the speed of winds aloft. (*Same item* as No. H–158 in Aug. 1950 *Meteorological Abstracts.*) *Subject Headings:* **Radar storm detection, Radar echoes, Thunderstorms, Snow, Rain drops.**

2H–36 551.501.8:551.508.85

Brooks, Herbert B., **Weather forecasting.** *Electronics*, 19:84–87, Oct. **1946.** 5 figs., photos, 4 refs. **DLC**—A brief review on radar as applied to meteorology. *Subject Headings:* **Radar observation, Radar equipment, Radar photographs.**

2H–37 551.501.81:551.515.4

Byers, Horace R., Holzman, A. C. and Maynard, R. H., **A project on thunderstorm microstructure.** *American Meteorological Society, Bulletin*, 27(4):143–146, April **1946. MH-BH**—Brief article outlining the program, methods of operation and analysis, application of radar, etc. *Subject Headings:* **Radar storm detection, Thunderstorms, Radar equipment.**

2H–38 551.508.85:621.396.826

Davies, H. and Macfarlane, G. G., **Radar echoes from the sea surface at centimeter wavelengths.** *Physical Society of London, Proceedings*, 58:717–729, Nov. 1, **1946. DLC**—This paper deals with radar operating at 1.25 cm., 3 cm. and 10 cm. under various weather conditions. *Subject Headings:* **Radar equipment, Radar echoes from sea.**

2H–39 551.508.85:621.396.826

Fink, Donald G., **The SCR-584 radar.** *Electronics*, 19:110–117, Feb. **1946.** 12 figs. **DLC**—Descriptive editorial article. Details for timing echoes to 0.01 mc./s. and deflecting system for PPI are given. *Subject Headings:* **Radar equipment, Radar echoes.**

2H–40 551.508.85:621.396.826

Fink, Donald G. and Engleman, Christian L., **Electronics at Bikini.** *Electronics*, 19:84–89, Nov. **1946.** 12 photos, tables. **DLC**—The use of radio and radar served two purposes: 1) to investigate the effect of the atom bomb blast on the operation of several other radio and radar sets that were operating in the vicinity and elsewhere, and 2) to investigate the effect of the blast cloud and its associated phenomena on radio wave propagation at various frequencies, on attenuation, generation of noise, atmospheric disturbance and on radar reflections from a target array. *Subject Headings:* **Radar equipment, Radar echoes, Ballistics, Radar photographs, Microwave propagation.**

2H–41 551.501.81

Forsythe, George E., **War-time developments in aircraft reconnaissance.** *American Meteorological Society, Bulletin*, 27(4):160–163, April **1946. MH-BH**—Use of dropsondes and radar in weather reconnaissance is mentioned briefly. *Subject Headings:* **Radar storm detection, Radar observation, Dropsondes.**

2H–42 551.510.535:551.515.8(51)

Gherzi, Ernest, **Ionospheric reflections and weather forecasting for Eastern China.** *American Meteorological Society, Bulletin*, 27(3):114–116, March **1946.** 4 refs. **MH-BH**—Investigations at the Zi-Ka-Wei Observatory (Shanghai) during the last 5 years show: 1) with dominant Pacific trade wind air mass: E layer reflection, 2) with Siberian air mass: F layer reflection and 3) with tropical air mass, in most cases: F2 layer reflection. *Subject Headings:* **Radar echoes, E layer, F layer, China.**

2H–43 551.508.85:621.396.826

Gilman, G. W., Coxhead, H. B. and Willis, F. H., **Reflection of sound signals in the troposphere.** *Acoustical Society of America, Journal*, 18(2):274–283, Oct. **1946.** 9 figs., 13 refs., 37 equations, append. **DLC**—A so-called "So-dar" (an acoustic low power radar device) was used in the experiments to detect the presence of heterogeneities in the lower atmosphere. Description of the apparatus and methods of observation are given and results presented. The experiments took place under conditions of inversion and steep humidity lapse rate. *Subject Headings:* **Radar equipment, Radar echoes, Reflection echoes, Radar observation.**

2H–44 551.508.85:621.396.826

Herbst, P. J., Wolff, Irving, Ewing, Douglas and Jones, Loren F., **The teleran proposal.** *Electronics*, 19:124–127, Feb. **1946.** 7 figs. **DLC**—Teleran is useful in making radar observations visible at a distance by a combination of television and radar techniques. *Subject Headings:* **Radar equipment, Radar echoes, Teleran.**

2H–45 551.501.81

*Maynard, Russell H., **Radar and weather.** Washington, D. C., U. S. Office of Chief of Naval Operations, Aerology Flight Section, Jan. **1946.** 31 p. 22 photos, 2 charts. **DWB**—A paper presented at the joint meeting of the Institute of Aeronautical Sciences and American Meteorological Society on Jan. 30, 1946. It deals mainly with weather as the creator of radar echoes. The use of radar in relation to wind force and direction is mentioned. The photographs, showing cold front, cold front showers, typhoon, hurricane, thunderstorm and summer showers, are excellent. *Subject Headings:* **Radar storm detection, Radar echoes, Radar photographs.**

2H–46 551.508.85:621.396.826

*Mofenson, Jack, **Radar echoes from the moon.** *Electronics*, 19:92–98, April **1946.** 7 figs., 4 photos, ref., 3 equations. **DLC**—Observations of radar echoes from the moon made at the Signal Corps Engineering Laboratories reveal: 1) that electromagnetic waves at a frequency of 110 mc. penetrated the ionosphere; 2) that echo return from moon is not always received after every transmission and 3) that the maximum range of the Signal Corps' radar on lunar target exceeds one million miles. The first moon echo was obtained by transmitting radio frequency at 111.5 mc. every 4 seconds. Audible and visible display of the moon echo arrived approximately 2.5 seconds after the transmission. A detailed diagrammatic description of instrumentation and techniques is given. A photograph taken at moon-rise Jan. 22, 1946, shows amplitude of moon echo. *Subject Headings:* **Radar equipment, Radar echoes, Moon, Radar photographs, Radar observation.**

2H–47 551.508.85:016

†Northwestern University, Technological Institute, Library, **Selected bibliography on radar.** Evanston, Ill., June **1946.** 38 sheets. Mimeographed. **DLC**—The bibliography includes 547 items arranged alphabetically by titles covering the following subjects: historical background, principles, terms, war, industry, photography, scientific, applications, scientists, transportation, applications, schools and prospects. The first entry goes back to 1619. *Subject Headings:* **Radar equipment, Bibliographies.**

2H–48 551.508.85

Pastukh, V. P., **Radiolokatsiia v meteorologicheskikh issledovaniiakh.** [Radio location in meteorological analyses.] *Meteorologiia i Gidrologiia, Informatsionnyĭ Sbornik*, No. 4:78–79, **1946. DLC**—Brief article on uses of radar in the weather service. *Subject Headings:* **Radar equipment, Synoptic analysis.**

2H–49 551.594.71:016

Proceedings at the Radiolocation Convention. *Institution of Electrical Engineers, Journal*, Pt. 1, 93(66):242–247, June **1946. DLC**—This report of the convention contains a classified list of the papers that were presented. Nine were on aerials and wave guides, 8 on propagation, 5 on cathode-ray-tubes, 8 on radio measurements and test gears, 1 on shipborne radar, 12 on transmitters and receivers, 8 on circuit techniques for radiolocation, 5 on radar navigation and 6 on naval gunnery radar. *Subject Headings:* **Radio propagation, Bibliographies.**

2H–50 551.508.85:621.396.826

Reber, C. M., **Applications of electronics to meteorology.** *American Meteorological Society, Bulletin*, 27(7):365–372, Sept. **1946.** 7 figs. **DWB, MH-BH**—A simple, illustrated account of the use of radar in detecting and tracking thunderstorms, showers, hurricanes, upper winds, rawinsondes, and a brief reference to sferics. *Subject Headings:* **Radar equipment, Radar storm detection, Sferics, Radar observation.**

2H–51 551.501.8:621.397.826

Siegert, A. J. F. and Martin, F. W., **Fluctuations in the return signals from random scatterers (window, rain, sea echo).** *Massachusetts Institute of Technology, Radiation Laboratory, Report* No. 773, Jan. 24, **1946.** 20+p. 4 figs., 4 refs., numerous equations, append. **DBS**—From H. GOLDSTEIN's preliminary measurements of the spectra of rain, window and sea returns, author has calculated the return signal spectrum by a correlation function. Examples of actual cloud spectra and a brief description of experimental methods are given. *Subject Headings:* **Radar observation, Random radar echoes.**

2H–52 551.501.8:551.508.85

Spilhaus, A. F., **Recent developments in meteorological equipment.** *American Meteorological Society, Bulletin,* 27(7):399–409, Sept. **1946.** 5 figs., 17 refs. **MH-BH**—A paper devoted to the war time demand for meteorological techniques and instruments. Radar, as used in storm and sferic detection, other instruments and their development until the present are described. *Subject Headings:* **Radar photographs, Radar equipment.**

2H–53 551.576.11:621.396.826

§Swingle, Donald M. and Wexler, Raymond, **A remarkable cloud-wave panorama.** *American Meteorological Society, Bulletin,* 27(9):519–522, Nov. **1946.** 4 figs., refs. **MH-BH**—Actual photographs of the cloud wave formation (at a time of extensive and continuous rain) which passed Belmar, New Jersey on March 8, 1946, are supplemented by PPI photographs and a synoptic chart for the day in question. *Subject Headings:* **Radar observation, Radar echoes, Cloud structure.**

2H–54 551.508.85:001

Synthetic words for radio equipment. *American Meteorological Society, Bulletin,* 27(4):163, April **1946. DWB, MH-BH**—A brief article giving definitions of words such as radar, loran, SS loran, shoran racon and sferics. *Subject Headings:* **Radar equipment, Definitions.**

2H–55 551.594.71:551.508.85(09)

†Vodop'ianov, F. A., **Radiolokatsiia.** [Radiolocation.] Moscow, Gosplanizdat, **1946.** 159 p. 101 figs., 155 refs., 48 equations. **DLC**—A survey of prewar published works whose purpose is to give the engineer and the scientist systematic material to judge the basic ideas and methods of radiolocation from the beginning of its development. *Subject Headings:* **Radar theory, Radio equipment, History of meteorology.**

2H–56 551.501.81:551.515.4

Wexler, Raymond, **Radar photographs of a frontal thunderstorm passage.** *American Meteorological Society, Bulletin,* 27(10):575, Dec. **1946. MH-BH**—Brief report on radar observations of this series of storms, with reference to the PPI photos which SPILHAUS presented in his article (*see item* No. 2H–52). (*Same item* as No. H–163 in Aug. 1950 *Meteorological Abstracts.*) *Subject Headings:* **Radar storm detection, Radar echoes, Thunderstorms, Radar photographs.**

2H–57 551.501.81:551.508.85

White, Fred D., **The Thunderstorm Project: Operational report on phase I.** *American Meteorological Society, Bulletin,* 27(9):549–550, Nov. **1946.** ref. **MH-BH**—Very brief report. Four SCR-584 stations (radar-rawin) made altogether 289 ascents. Average altitude was 34,700 ft. and maximum height reached was 72,000 ft. The most interesting data were obtained by ten P-61 C's (Black Widow night fighter aircraft) that were equipped with the SCR-720 airborne radar. *Subject Headings:* **Radar storm detection, Radar equipment, Thunderstorms.**

2H–58 551.501.81:551.515

Winters, S. R., **Spotting hurricanes and thunderstorms by radar.** *Radio News,* 35(3):45, 100, 102, 104, March **1946.** 4 figs. **DLC**—Popular article on how the AAF crew, in the vicinity of Orlo Vista, Fla., detected the hurricane of Sept. 15–16, 1945 and accurately plotted on filmstrips the progress of the hurricane. *Subject Headings:* **Radar storm detection, Radar photographs, Radar echoes, Hurricanes, Thunderstorms.**

2H–59 551.508.85:551.508.57

*Yuan, Luke Chia-liu, **Ultra high frequency radio direction finding.** *Institute of Radio Engineers, Proceedings,* 34(11):852–857, Nov. **1946.** 10 figs., 3 tables. **DLC**—An extremely simple device operated at 183 megacycles is used to observe flight of meteorological balloons. The accuracy is $\frac{1}{4}°$ by determining the azimuthal angles and $\frac{1}{2}°$ by determining the elevation angles when ground operated. Accuracy decreases when the device is air borne. Description of the device, methods and some observational results are given. *Subject Headings:* **Radio equipment, Radar observation.**

1947

2H–60 551.501.83:551.508.85

Adcock, F. and Clarke, C., **The location of thunderstorms by radio direction-finding.** *Institution of Electrical Engineers, Journal,* Pt. III, 94(28):118–125, March **1947.** 7 figs., 3 tables, 6 refs. **DBS**—The nature of radiation from a lightning flash is discussed. Description of a direction finder of great accuracy is given. Causes of instrumental inaccuracies and methods of improvement are discussed. *Subject Headings:* **Sferics, Radar storm detection, Radio equipment, Radio echoes, Thunderstorms, Lightning.**

2H–61 551.501.8 551.508.85

*Alexander, F. E. S., **Observations of unorthodox radar vision in the vicinity of New Zealand and Norfolk Island.** (In **Meteorological factors in radio-wave propagation.** London, Physical Society, [1947]. p. 242–249. 3 figs., 3 tables.) **DWB**—Unorthodox radar vision is largely associated with "föhn" in the southern part and with slow-moving anticyclones in the northern part of New Zealand. Tables present number of days when unorthodox vision was recorded. *Subject Headings:* **Radar storm detection, Radar echoes, New Zealand.**

2H–62 551.594.71:551.501.8

*Anderson, Lloyd J., Day, John P., Freres, Clemens H. and Stokes, Alfred P. D., **Attenuation of 12.5 centimeter radiation through rain.** *Institute of Radio Engineers, Proceedings*, 35(4):351–354, April **1947.** 7 figs., 2 refs. **DLC**—This experimental determination of attenuation of 12.5 centimeter radiation through rain gave a result of 0.37 decibels/mile/mm./hr. It changed slowly with intensities of rainfall; approximately 0.50 at low and 0.35 at high intensities. Drop size measurements were made. The experiment took place near Hilo, Hawaii because of intense precipitation and ample clearance for calibration. *Subject Headings:* **Radio propagation, Radar observation, Radio echoes, Rain, Hilo, Hawaiian Islands.**

2H–63 551.510.535:551.590.25

†*Appleton, Sir Edward Victor and Naismith, R., **The radio detection of meteor trails and allied phenomena.** *Physical Society of London, Proceedings*, 59(333):461–472, May **1, 1947.** 10 figs., 2 photos, 14 refs., 4 equations, append. Discussion by G. M. Garrat p. 472–473. **DLC**—The results of some radio sounding observations are presented. It is confirmed that ionization bursts, observable throughout the day, are due to sporadic meteors. Support is given to the view that abnormal or sporadic E layer ionization is due mainly to the same cause. A note on audibly whistling meteors is appended. (*Same item* as 1.173 in Jan. 1950 *Meteorological Abstracts.*) *Subject Headings:* **Radar storm detection, Radio echoes, Meteors, E layer.**

2H–64 551.501.8:551.578.11

Austin, Pauline M., **Measurements of approximate raindrop size by microwave attenuation.** *Journal of Meteorology*, 4(4):121–124, Aug. **1947.** 2 figs., table, 7 refs., 12 equations. **MH-BH**—Author discusses the possibility of determining the approximate size of drops by a comparison between echo strength and attenuation on two different wave lengths. *Subject Headings:* **Radar observation, Radar echoes, Raindrop size.**

2H–65 551.508.85:621.396.826

Austin, Pauline M., **Note on comparison of ranges of radio set SCR-615-B and radar set AN/TPS-10 A for storm detection.** *Massachusetts Institute of Technology, Dept. of Meteorology, Weather Radar Research, Technical Report*, No. 5, Nov. 15, **1947.** 12 p. graph, 10 PPI photos, 3 tables, 4 refs., 5 equations. **DWB**—From theoretical considerations, the 615-B range is at least $2\frac{1}{2}$ times as great as that of the TPS-10. This is evident in the PPI photographs. *Subject Headings:* **Radar equipment, Radio equipment, Radar echoes.**

2H–66 551.501.8:551.576.4

*Austin, Pauline M., **On the probability of detecting bases and tops of clouds by radar at K-band or at shorter wave lengths.** *Massachusetts Institute of Technology, Dept. of Meteorology, Weather Radar Research, Technical Report* No. 2, Oct. **1, 1947.** 19 p. 7 figs., 5 tables, 10 equations. **MCM**—*Subject Headings:* **Radar echoes, Clouds.**

2H–67 551.501.81

Bailey, Henry C., **Electronics in the Antarctic.** *Electronics*, 20:82–88, Aug. **1947.** 8 photos. **DLC**—Fire control radar was used on two vessels to carry out observations of high altitude wind speed and direction, location of icebergs, etc. Owing to bad weather such observations would otherwise not be possible for the U. S. Navy Antarctic Expedition. *Subject Headings:* **Radar storm detection, Radar equipment, Radar echoes, Icebergs, Antarctic.**

2H–68 551.501.81

Bemis, Alan C., **Weather radar research at M.I.T.** *American Meteorological Society, Bulletin*, 28(3):115–117, March **1947.** 4 refs. **MH-BH**—Brief note on the research program. *Subject Heading:* **Radar storm detection.**

2H–69 551.574.1:551.594.7

Byers, Horace R. and Coons, Richard D., **The "bright line" in radar cloud echoes and its probable explanation.** *Journal of Meteorology*, 4(3):75–81, June **1947.** 15 figs., table, 4 refs. **MH-BH**—Authors maintain "that ice particles and water droplets might form a coherent pattern rein-

forcing the scattering at or near the freezing level." PPI and RHI photographs showing the bright line, accompany the article. Some observed storms are discussed. *Subject Headings:* **Radar echoes, Bright band echoes, Radar photographs, Radar storm detection, Cloud structure.**

2H–70 551.501.81:551.515.4

§Coons, R. D., **Guided propagation of radar in thunderstorm conditions.** *American Meteorological Society, Bulletin*, 28(7):324–329, Sept. **1947.** 8 figs., 2 refs. **MH-BH**—A brief paper accompanied by excellent PPI photographs showing movement of a thunderstorm. *Subject Headings:* **Radar storm detection, Radar echoes, Thunderstorms, Radar photographs.**

2H–71 551.501.8:551.574.1

Cunningham, Robert M., **A different explanation of the "bright line."** *Journal of Meteorology*, 4(5):163, Oct. **1947. MH-BH**—Discussing article by Byers and Coons (*see item* No. 2H–67), author has found, in accordance with the M.I.T. analysis (MIT., Weather Radar Research Signal Corps Contract No. W-36-039-SC-32038) of the cause of the bright band, that the observations and radar photographs show that the region above the bright line gives less return than the region below it. Byers, in his brief reply, finds author's explanation plausible. However, Byers has photographs showing no return from above the bright line. *Subject Headings:* **Radar echoes, Bright band echoes, Radar photographs, Cloud structure.**

2H–72 551.590.25:621.396

Eckersley, T. L., **Evaporation of meteors.** *Nature*, London, 160(4055):91, July 19, **1947.** ref. **DLC**—Some radar photographs published in *Nature* and *The Times* are discussed as to whether they show scatter clouds rather than meteors, as it is suggested that the former can be produced from evaporation of small meteors. *Subject Headings:* **Radar photographs, Radar echoes, Meteors.**

2H–73 551.508.85:621.397.826:523.5

†*Hey, J. S. and Stewart, G. S., **Radar observations of meteors.** *Physical Society of London, Proceedings*, 59(335):858–883, Sept. 1, **1947.** 25 figs., 5 tables, 29 refs., numerous equations. **DLC**—Short duration echoes at the E region are investigated. Echoes are more frequent at the height of 95 km. Beam radio equipment was used (4–5 m. wave length). Directional characteristics, revealed by application of oblique beam equipment, indicate characteristic close similarity of echoes and meteors. Methods of determining the radiants of the most active meteor streams and determination of geometric velocities are given. *Subject Headings:* **Radar equipment, Radar echoes, E-layer, Meteors, Radar observation.**

2H–74 551.578:621.396.9

Hooper, J. E. N. and Kippax, A. A., **Interim report on measurements of radar echo intensities from rain and snow.** *TRE* [Telecommunications Research Establishment], *Report*, T-2082, **1947.**—Unchecked. *Subject Headings:* **Radar storm detection, Radar echoes, Rain, Snow.**

2H–75 551.501.81:551.508.85:551.515.4

Khastgir, S. R., Das Gupta, M. K. and Ganguli, D. K., **Location of thunderstorms from directional observations of atmospherics during sunrise and sunset.** *Nature*, London, 159(4043):572–573, April 26, **1947.** fig., table, 8 refs. **DLC**—A method to estimate difference between longitude of source and receiver is discussed. *Subject Headings:* **Radar storm detection, Radar equipment, Sferics, Thunderstorms.**

2H–76 551.501.8:551.508.85

Levy, M., **Signal-noise ratio in radar.** *Wireless Engineer*, 24(291):349–352, Dec. **1947.** 5 figs., 5 equations. **DLC**—This study demonstrates the application of statistics to radio (radar) problems. The small pulses, that are so hard to detect, especially when mixed with noise, will be improved greatly in visibility on the cathode ray tube by a method of cutting either the upper or lower part of the received signal by a limiter. The method is described in detail. *Subject Headings:* **Radar observation, Radio equipment, Radar equipment.**

2H–77 551.508.85:551.508.1

Ligda, Myron G. H., **Radar scope photography.** *Massachusetts Institute of Technology, Dept. of Meteorology, Weather Radar Research, Technical Report*, No. 4, [**1947**]. 63 p. 18 figs., 14 photos, append. **DWB**—Radar scope photographs are an aid to both the theoretical and practical meteorologist. *Subject Headings:* **Radar equipment, Radar observation, Radar photographs.**

2H–78 551.594.7:551.594.5

Lovell, A. C. B., Clegg, J. A. and Ellyett, G. D., **Radio echoes from the aurora borealis.** *Nature*, London, 160(4063):372, Sept. 13, 1947. 6 refs. **DLC**—Echoes obtained during the night of August 15–16, 1947 apparently originated in a luminescent cloud which appeared near the end of an aurora streamer. *Subject Headings:* **Radio echoes, Luminescent clouds, Auroras, England.**—*From author's abstract.*

2H–79 551.508.85:551.577

MacDowell, Gordon P., **A study of the slopes of radar precipitation echoes.** Massachusetts Institute of Technology, Dept. of Meteorology, [1947?]. 13 p. 5 figs., numerous equations. Typewritten. **MCM**—This work is in its original manuscript form, partly typed, partly in handwriting. It is an attempt to verify statistically the theoretical explanation of the observed cell slope as presented by ROBERT M. CUNNINGHAM in a seminar at M.I.T. Photographs (2860) of storms occurring from April through Dec. 1947 were examined in a film viewer, 206 of them showing measurable cells. *Subject Headings:* **Radar photographs, Radar echoes, Precipitation.**

2H–80 551.501.8:551.518.11

Marshall, J. S., Langille, R. C. and Palmer, W. McK., **Measurement of rainfall by radar.** *Journal of Meteorology*, 4(6):186–192, Dec. **1947.** 6 figs., 9 refs., 14 equations. **DWB, MH-BH**—"The theoretical finding that the power obtained from radiation reflected from rain is proportional to (Z), the sum of the sixth power of diameters of raindrops contained in a representative volume" is presented mathematically. Variation of rain content with height is moderate and calculable, hence it might be possible to determine the intensity of rainfall at a distant point (appr. 100 km.) with useful accuracy, by radar echoes from this point. *Subject Headings:* **Radar observation, Radar echoes, Rainfall intensity.**

2H–81 551.501.8:551.578.1

Measurements of rainfall by radar. *Canadian Army Operational Research Group, Report* No. 47, Sept. 1, **1947.** 42 p.—Unchecked. *Subject Headings:* **Radar observation, Rainfall measurement.**

2H–82 551.501.81:551.508.85

*Miller, Robert W., **The use of airborne navigational and bombing radars for weather-radar operations and verifications.** *American Meteorological Society, Bulletin*, 28(1):19–28, Jan. **1947.** 4 photos, table, ref. **MH-BH**—The results of weather flights with airborne radar equipment are discussed. *Subject Headings:* **Radar storm detection, Radar equipment, Radar photographs.**

2H–83 551.501.8

1. Negotiating a line squall using airborne radar. 2. Simultaneous use of radar for terrain clearance and weather observations. 3. Navigation by search radar. 4. Attenuation of radar signals from heavy rain. *American Airlines, Flight Report* No. 57, Oct. **1947.**—Unchecked. *Subject Headings:* **Radar observation, Radar storm detection.**

2H–84 551.594.72:621.397.82

*Ryde, J. W., **The attenuation and radar echoes produced at centimetre wave-lengths by various meteorological phenomena.** (In **Meteorological factors in radio-wave propagation.** London, Physical Society, [1947?]. p. 169–188. 10 figs., 5 tables, 15 refs., 23 equations.) **DWB**—A computation of attenuation and intensity of echoes caused by fog, clouds and precipitation are discussed. Tables and curves for calculating those factors are given. Brief discussion by E. G. RICHARDSON, G. W. N. GOBOLD and F. R. LEATHERDALE, p. 188–189. *Subject Headings:* **Radar propagation, Radar echoes, Clouds, Fog, Precipitation.**

2H–85 551.508.85:551.509.3

Shliamin, B. A., **Radar i pogoda.** [Radar and weather.] *Priroda*, Moscow, No. 3:50–52, **1947.** 3 photos, 4 refs. **DLC**—Brief article on radar as applied to weather forecasting. *Subject Headings:* **Radar equipment, Radar observation, Weather forecasting.**

2H–86 551.594.7:551.578.1

*Smith, David Gage, **An explanation of horizontal layers in the atmosphere as observed by radar.** Thesis (M.A.)—Massachusetts Institute of Technology, **1947.** 41+leaves, 12 figs., 8 tables, 8 refs. **DAWS**—Author suggests, that until more exact observations and measurements can be made to determine meteorological effects and processes associated with radar echo layers, it is apparent that several effects, varying in significance from time to time, operate simultaneously: 1) increase of echo

by melting snow, 2) decrease of echo by evaporation and precipitation and 3) increase of echo by support of precipitation by air currents. *Subject Headings:* **Radar echoes, Atmospheric structure, Snowstorms, Precipitation.**

2H–87 551.508.85:551.577

*Smith, E. Dillon and Fletcher, Robert D., **A summary of the uses of radar in meteorology.** *American Geophysical Union, Transactions*, 28(5):713–714, Oct. **1947.** 3 figs., table. **DWB**—An abstract of a paper presented before the American Meteorological Society's meeting in Washington, D. C., May 28, 1946. Authors propose: 1) the use of radar to measure amount of rainfall, 2) the investigation of the correlation between the image of an A-oscilloscope or PPI-scope and the corresponding isohyetal pattern derived from observed rainfall data; and present a new table for classifying the intensity of precipitation. Effects of water droplets on microwave attenuation were illustrated (in terms of db./mile). Comparison made between AN/APS-2F radar (3000 mc./s.) and AN/APS-15 radar (10,000 mc./s.) appears to be in favor of the latter as it gives higher definition. Attenuation due to oxygen and water vapor was discussed and table showing the curves is presented. *Subject Headings:* **Radar equipment, Radar echoes, Rain, Radar observation.**

2H–88 551.501.81:551.515.4

Tolefson, Harold B., **Preliminary analysis of NACA measurements of atmospheric turbulence within a thunderstorm.** U. S. Weather Bureau Thunderstorm Project. *U. S. NACA, Technical Note* No. 1233, March **1947.** 9 p. 3 figs., 2 tables, 3 refs., equation. **DWB**—Photographs, at 15 second intervals, of ground radar indications and of the locations of the aircraft in thunderstorms, together with detailed measurements of storm intensity (55 stations covering a 7x15 miles area) provided data for the study of radar as an aid in storm detection. *Subject Headings:* **Radar storm detection, Radar equipment, Radar echoes, Thunderstorms, Radar photographs.**

2H–89 551.594.7:551.515

Westwater, F. L. and Ross, R. G., **Radar storm detection. Part I–II.** (In **Meteorological factors in radio-wave propagation.** London, Physical Society, [1947?]. p. 190–193. 5 figs., chart.) **DWB**—In Pt. I, Westwater presents 5 PPI photographs, one of which is striking as it is taken but 40 miles from the centre of a Pacific typhoon. In Pt. II, Ross stresses the need for correlation between radar observations and the synoptic chart and other weather information. An example is given. *Subject Headings:* **Radar storm detection, Radar photographs, Radar echoes.**

2H–90 551.515.2 551.501.81

Wexler, Harry, **Structure of hurricanes as determined by radar.** *New York Academy of Sciences, Annals*, Vol. 48, Art. 8:821–844, Sept. 15, **1947.** 8 figs., 2 tables, 12 refs. **DLC**—Discussion of radar observations of the hurricane of September 14–15, 1945 in Florida, as photographed at Orlando. Path of pressure center compared with path of rotation, as deduced from radar scope photographs shown. Discussion of drop size necessary for returns and evident weather conditions accompanying this hurricane as deduced from such returns and from surface observations in a close network. Analysis of cloud or precipitation bands forming concentric (spiraling inward) rings and a tentative explanation is given. Comparison with conditions observed by radar, etc., in typhoons of Aug. 26, 1945 and Dec. 18, 1944 in the west Pacific, including width of bands, spacing of bands, inward spiraling of bands, eye of the storm, and explanation of bands. Path of Florida hurricane shown: Possibility of tilt of axis with height discussed. Errors in determination of pressure center and of radar center, and true difference between pressure center and rotation center can be calculated. Deppermann's data show that pressure and wind rotation centers do not always coincide. *Subject Headings:* **Radar storm detection, Hurricanes, Radar echoes, Florida.**—*M.R.*

2H–91 551.501.81:551.515.8

*§Wexler, Raymond, **Radar detection of a frontal storm, 18 June 1946.** *Journal of Meteorology*, 4(1):38–44, Feb. **1947.** figs., 13 PPI photos, 7 refs., 7 equations. **MH-BH**—An example of the life of a cold front as seen on PPI photographs. These photographs and the rain intensity along the front are explained by the theory of radar storm detection. *Subject Headings:* **Radar storm detection, Radar echoes, Precipitation, Radar photographs.**

2H–92 551.501.8:551.515.8

Wexler, Raymond, **Radar photographs of a frontal wave.** *Journal of Meteorology*, 4(2):69–71, April **1947.** 6 PPI photos, 2 refs. **MH-BH**—PPI photographs were taken at ½ hourly intervals showing precipitation along the frontal wave. *Subject Headings:* **Radar echoes, Precipitation, Frontal waves.**

2H–93 551.501.81:621.396.029.64

†Wexler, Raymond and Swingle, Donald M., **Radar storm detection.** *American Meteorological Society, Bulletin*, 28(4):159–167, April **1947.** 6 figs., 2 tables, 11 refs., 8 equations. **MH-BH**—Authors discuss radar theory, attenuation, absorption and scattering problems. Comparatively—according to the authors—3 to 6 cm. wave lengths are to be preferred to 9 to 12 cm. waves in most cases for storm detection. (*Same item* as No. H–173 in Aug. 1950 *Meteorological Abstracts.*) *Subject Headings:* **Radar storm detection, Radar equipment, Radar echoes, Radar propagation.**

2H–94 551.501.8:551.508.85(02)

Williams, Edwin L., Jr. and Wilson, George A., **Standard operational procedures.** *Massachusetts Institute of Technology, Dept. of Meteorology, Weather Radar Research, Technical Report* No. 3, Oct. 1, **1947.** 78 p. numerous figs. and photos, append. Mimeographed. **DWB**—An instruction manual for personnel of coordinated air-ground weather radar flights. Includes various check lists, data sheets, equipment instruction sheets, as well as specific standard operating procedures. *Subject Headings:* **Radar observation, Radar storm detection, Radar equipment, Manuals.**

1948

2H–95 551.508.85:621.396.826

Alfred, R. V. and Reiss, A., **An anti-clutter radar receiver.** *Institution of Electrical Engineers, Journal*, Pt. III, 95(38):459–465, Nov. **1948.** 12 figs., 3 refs., 3 equations. **DLC**—By "clutter" authors mean reflections from land, sea or rainstorms in vicinity of the target. *Subject Headings:* **Radar equipment, Radar echoes, False echoes.**

2H–96 551.501.8:551.509.21

Ångström, Anders, **Den senaste utvecklingen av väderlekstjänstens tekniska hjälpmedel.** [Recent developments of technical facilities for weather service.] *Ymer*, Stockholm, 68(3):189–205, **1948.** 7 figs. In Swedish. **DLC**—An illustrated article describing in considerable detail the new facilities that have been developed since the war for filling in the gaps in the weather map: the network of Ocean Weather Ships in the Atlantic; the use of radar to detect hurricanes, showers and thunderstorms that might develop or "slip through" between stations or weather ships; the weather flights made by the U. S. over the Pacific, the Caribbean, the Atlantic and Arctic (from Fairbanks to the Pole) to supply synoptic and aerological reports where no surface stations exist; thunderstorm and frontal detection by radiogoniometry or sferics; the use of radar to determine upper air winds and, finally, the new methods of synoptic analysis used by the Swedish Weather Service (use of pressure surface contours instead of isobars for upper air analysis). (*Same abstract* as No. 10–11 in Nov. 1950 *Meteorological Abstracts.*) *Subject Headings:* **Radar equipment, Radar observation.**—*M.R.*

2H–97 551.577.1:621.396

Austin, Pauline M., **A group of graphs showing estimated radar return from precipitation.** *Massachusetts Institute of Technology, Dept. of Meteorology, Weather Radar Research, Technical Report* No. 6, April 1, **1948.** 8 p. 10 graphs, 8 PPI photos, tables, 2 refs., append. **DWB**—First part of this report gives in graphical form the theory and expressions of intensity of radar returns from precipitation, the second part illustrates the use of these graphs by the study of measurements of 4 snowstorms. *Subject Headings:* **Radar storm detection, Radar observation, Radar echoes, Precipitation, Snowstorms, Radar photographs.**

2H–98 551.577.37:621.396.826

Bent, A. E., **Echoes from tropical rain on X-band airborne radar.** *Massachusetts Institute of Technology, Radiation Laboratory, Report* 728, June 15, **1948.** 16 p. 10 figs. **DWB**—Tropical rain masking a desired target is described. At times, echoes from intense showers may be confused with echoes from the desired target. Methods of distinguishing the echoes are presented. *Subject Headings:* **Radar observation, Radar echoes, Rain, Masking effects.**

2H–99 551.501.8:551.515.4

Byers, Horace R. and Battand, Louis J., **Some effects of vertical wind shear on thunderstorm structure.** *U. S. Weather Bureau, Thunderstorm Project, Report* No. 8, [**1948**]. 16 p. 7 figs., 10 refs., equation. **DWB.** Reprint in *American Meteorological Society, Bulletin*, 30(5):168–175, 1949. **MH-BH**—Observations of thunderclouds obtained with a 3-cm. height-finding radar set are used to obtain a description of the vertical shear of thunderclouds. Several photographs are given which show the shearing of the radar clouds. A scattergram of wind shear plotted against echo shear is presented and shows that the two variables are related, with the former exceeding the latter in almost all cases. Scatter-diagrams are given which verify that strong vertical wind shear tends to restrict the growth of thunderstorms. A series of radar cross sections illustrates the displacement of

the upper part of a thundercloud which is subject to wind shear, and the growth of another cloud column from the lower part of the thundercloud. (*Same item* as No. H-206 in Aug. 1950 *Meteorological Abstracts.*) *Subject Headings:* **Radar observation, Thunderstorm structure.**—*Authors' abstract.*

2H–100 551.501.81:551.515.4

†*Byers, Horace B. and Braham, Roscoe R., Jr., **Thunderstorm structure and circulation.** *Journal of Meteorology*, 5(3):71–86, June **1948.** 23 figs., 16 refs. **DLC, MH-BH**—Data from observations in Florida (Thunderstorm Project) are analyzed and discussed. Thunderstorm of July 9, 1946 is treated in more detail and is illustrated by PPI photographs. *Subject Headings:* **Radar storm detection, Radar observation, Radar echoes, Thunderstorms, Radar photographs, Florida.**

2H–101 551.501.81:551.577

Byers, Horace R. and collaborators, **The use of radar in determining the amount of rain falling over a small area.** *American Geophysical Union, Transactions*, 29(2):187–196, April, **1948.** 12 figs., table, 11 refs. **DWB**—Radar storm echoes and rain gage data are compared. It is found that radar can measure rainfall about as accurately as a micronetwork of rain gages. For thunderstorms it is found that the areas of rainfall can be determined with accuracy by the radar. (*Same item* as H–177 in Aug. 1950 *Meteorological Abstracts.*) *Subject Headings:* **Radar storm detection, Radar echoes, Thunderstorm rainfall.**—*H.P.K.*

2H–102 551.501.81

†§*Cunningham, Robert M. and Miller, Robert W., **Five weather radar flights. Measurements and analysis.** *Massachusetts Institute of Technology, Weather Radar Research, Technical Report*, No. 7, Dec. 1, **1948.** 54 p. 81 figs., 19 refs. **DWB, MH-BH**—The results of five weather flights during 1947–1948 are presented and analyzed. *Subject Headings:* **Radar storm detection, Radar observation, Radar echoes.**

2H–103 551.508.85

Descamps, Alphonse, **Le R.A.D.A.R. et ses applications.** [Radar and its applications.] *Belgium, Institut Royal Météorologique, Miscellanées*, Fasc. 30, **1948.** 29 p. 9 figs., 3 refs., numerous equations. **DLC**—Brief, general review of radar as applied in various fields of meteorology. Two PPI photos of meteorological interest. A comprehensive and well illustrated review of the theory and history of electromagnetic sounding, which is shown to be a consequence of earlier sonic and recent ultra-sonic sounding techniques. The various RADAR (radiolocation or D.E.M.) methods and equipment in use in America, England, France, Germany and elsewhere are reviewed, and numerous applications to meteorology cited. PPI-slopes, LORAN, military application and uses in pure science are also discussed. *Subject Headings:* **Radar equipment, Radar photographs.**

2H–104 551.508.85:551.509

Duncan, P. F., **Radar and the forecaster.** *Weather*, 3(2):34–36, Feb. **1948. MH-BH**—Note on radar as used to obtain meteorological material for weather forecasting. *Subject Headings:* **Radar equipment, Radar observation, Weather forecasting.**

2H–105 551.501.81:551.515.4

Flying around and through thunderstorms using airborne radar. *American Airlines, Flight Test Report* No. 58, **1948.** Unchecked.—*Subject Headings:* **Radar storm detection, Radar equipment.**

2H–106 551.501.81:551.508.85

Friend, Albert W., **Continuous tropospheric soundings by radar.** *Institute of Radio Engineers, Proceedings*, 36(4):501–503, April **1948.** 5 figs., 6 refs. **DLC**—Using the SCR-584 radar, continuous soundings were obtained and recorded on film strips by an ionospheric recording camera fitted to the PPI system. Comparison with radiosonde data indicates that the so-called dot echoes correspond to the top of moist stratum of air and may be produced by oriented surfaces of dielectric transition, randomly occurring within air-mass boundry transition layers. "Dot echoes" are presented in contrast with scattering echoes from stratus, altostratus and cirrus clouds. *Subject Headings:* **Radar storm detection, Clouds, Radar echoes, Radar photographs.**

2H–107 551.501.8:621.396.822

Goldman, Stanford, **Some fundamental considerations concerning noise reduction and range in radar and communications.** *Institute of Radio Engineers, Proceedings*, 36(5):584–594, May **1948.** 6 figs., refs., 23 equations. **DLC**—A general mathematical analysis, based upon the theory of probability, is applied in this investigation to microwave signals through a background of random noise. The problems of noise reduction are treated in some detail and author discusses some possible

ways to improve upon the range of radar and communication systems. Author deals with the question of possible similarity and relation of his work to biology and psychology. *Subject Headings:* **Radar observation, Radar echoes, Sferics, Radar equipment.**

2H–108 551.501.83:551.508.911

Kessler, William J. and Knowles, Harold L., **Direction finder for locating storms.** *Electronics*, 21:106–110, May **1948.** 6 figs., 2 photos, 11 refs. **DLC**—An instantaneous static direction finder and some experimental results of a network are discussed. The device consists of two loop antennas right-angled to each other. The vertical and the horizontal signal voltage, after being separately amplified, give visible flash lines on a tube screen indicating direction of static. *Subject Headings:* **Radar storm detection, Radar equipment, Sferics.**

2H–109 551.501.7:551.508.85

*Kirkman, Robert A. and LeBedda, John M., **Meteorological radio direction finding for measurement of upper air winds.** *Journal of Meteorology*, 5(1):28–37, Feb. **1948.** 14 figs., 4 refs., equation. **DWB**—Radio and radar equipment for tracking meteorological balloons was developed by the U. S. Signal Corps at their Engineering Laboratories at Fort Monmouth, N. J. Various types of equipment (SCR-258, SCR-525, SCR-658 and AN/CRD-1), the Caltech aural direction-finder, various types of antennas and mobile ground sets are described and illustrated, along with charts showing performance and accuracy ranges. Balloons may be tracked to over 100,000 ft. height with angular errors of the order of .05 to .15 degrees. (*Same abstract* as No. 5–14 in May 1950 *Meteorological Abstracts.*) *Subject Headings:* **Radar equipment, Upper wind measurements, Radar echoes.**—*M.R.*

2H–110 551.501.81:551.577

Langille, R. C. and Gunn, K. L. S., **Quantitative analysis of vertical structure in precipitation.** *Journal of Meteorology*, 5(6):301–304, Dec. **1948.** 3 figs., 2 refs., 4 equations. **DWB, MH-BH**—Some experiments of comparative radar and rain gage measurements are briefly discussed. *Subject Headings:* **Radar storm detection, Radar equipment, Radar echoes, Precipitation, Radar photographs.**

2H–111 551.508.85:621.396.826

Leas, J. W., **Surveillance radar deficiencies and how they can be overcome.** *Institute of Radio Engineers, Proceedings*, 36(8):1015–1017, Aug. **1948. DLC**—Meteorological factors to consider are: 1) cloud reflections which can mask echoes from aircrafts, 2) 3000 Mc. radar is disturbed by storm-cloud return and 3) the 200 Mc. radar, not influenced by storm clouds, which gives low definition as frequently is low, hence a higher frequency must be balanced against increased cloud returns. *Subject Headings:* **Radar equipment, Radar echoes, Clouds, Masking effects.**

2H–112 551.508.85:551.515.8

*Ligda, Myron G. H., **Radar scope photography and its use in studying frontal structure.** Thesis (M.A.)—Massachusetts Institute of Technology, [**1948**]. 116 p. numerous figs., tables and equations, 5 refs., append. **DWB**—First part of this work includes a technical report (*see item*, No. 2H–77). Second part deals with the use of radar photographs in frontal structure studies and contains a description of equipment and an analysis of radar PPI presentations of growth and movement of precipitation cells. The storms of Oct. 30–31 and of Dec. 15–16, 1947 are analyzed as examples of cold and warm fronts, respectively. *Subject Headings:* **Radar equipment, Radar photographs, Radar echoes, Precipitation cells, Frontal structure.**

2H–113 551.590.25:621.30(71)

Lovell, A. C. B., **Combined radar, photographic and visual observations of the Perseid meteor shower of 1947.** *Nature*, London, 161(4086):278–280, Feb. 21, **1948.** tables. **DLC**—Results of observations at the Dominion Observatory, Ottawa and the National Research Council of Canada are given. *Subject Headings:* **Radar observation, Radar echoes, Meteors, Canada.**

2H–114 551.501.81:551.578.11

Marshall, J. S. and Palmer, W. M. K., **The distribution of raindrops with size.** *Journal of Meteorology*, 5(4):165–166, Aug. **1948.** 2 figs., table, 3 refs., 3 equations. **DWB, MH-BH**—Brief note on raindrop size measurements (recorded on filter paper) correlated with radar echoes. *Subject Headings:* **Radar equipment, Radar echoes, Precipitation, Radar observation, Raindrop size.**

2H–115 551.501.8:621.396.826

Payne-Scott, Ruby, **The visibility of small echoes on radar PPI displays.** *Institute of Radio Engineers, Proceedings*, 36(2):180–196, Feb. **1948.** 12 figs., table, 6 refs., 37 equations. **DLC**—A general theory of visibility for an isolated echo on an intensity-modulated display is developed and put into a mathematical form, which enables the least visible signal to be calculated. Theory has

been checked and found generally true. *Subject Headings:* **Radar observation, Radar equipment, Radar echoes.**

2H–116 551.501.81:551.551:629.135

*Press, H. and Binckley, E. T., **A preliminary evaluation of the use of ground radar for the avoidance of turbulent clouds.** *U. S. NACA, Technical Note* 1684, Sept. **1948.** 13 p. 4 figs., 2 tables, 4 refs. **MH-BH**—An analysis of gust data indicating that turbulence can be greatly reduced by circumnavigating areas of radar echoes, indicated by ground radar. Data indicating the amount of reduction of turbulence that may be expected are presented. *Subject Headings:* **Radar storm detection, Radar echoes, Turbulence, Radar equipment.**

2H–117 551.508.85:551.501.8

Radar storm detection. *Marine Observer*, 18(139):73–80, Jan. **1948.** 6 figs. **DWB, MH-BH**—This paper is devoted to what radar can and can not do in relation to observations of meteorological phenomena. *Subject Headings:* **Radar equipment, Radar observation, Radar echoes.**

2H–118 551.501.81:551.515.4:629.135

†*A report on thunderstorm conditions affecting flight operations.** *U. S. Weather Bureau, Technical Paper* No. 7, April **1948.** 52 p. 12 figs., 20 tables, 15 refs. **DWB**—Some preliminary observations during storms in Florida, spring and summer of 1946, and in Ohio during spring and summer of 1947. The observations were carried out with ground radar and airborne radar through the P-61C (Black Widow) flights. Thunderstorms at altitudes from 5000 up to 26,000 ft. were traversed and important observations obtained. *Subject Headings:* **Radar storm detection, Radar echoes, Thunderstorms, Radar equipment, Radar photographs, Aircraft protection.**

2H–119 551.501.81:551.508.85:629.135

Silsbee, Nathaniel F. and Brown, Ralph W., **The Air Force flies the weather.** *Aero Digest*, 56(4):37–38, 80–81, April **1948.** 6 photos. **DLC**—During the 790 "all-weather-flights" of 1946–1947, devices were tested to overcome weather conditions that otherwise grounded aircraft. Various types of radar used in weather reconnaissance are described. *Subject Headings:* **Radar storm detection, Radar equipment.**

2H–120 551.501.81:551.578.11

†Spilhaus, Athelstan F., **Drop size, intensity, and radar echo of rain.** *Journal of Meteorology*, 5(4):161–164, Aug. **1948.** 2 figs., 2 tables, 8 refs., 12 equations. **MH-BH**—An examination of an experimental set-up utilizing a simple relation between terminal speed and size of raindrops and an empirical drop-size distribution. *Subject Headings:* **Radar observation, Raindrop size.**

2H–121 551.501.81:551.508.85(02)

Standard operating procedure for radar storm detection. U. S. Air Weather Service, Nov. **1948.** 15 p. numerous refs., 3 append. **DWB**—". . . to define a uniform procedure for the operation of radar storm detecting stations." *Subject Headings:* **Radar storm detection, Radar equipment, Manuals.**

2H–122 551.501.81:551.551

*Steiner, Roy, **An evaluation of air-borne radar as a means of avoiding atmospheric turbulence.** *U. S. NACA, Research Memorandum*, No. L 8101, Nov. 22, **1948.** 9 p. fig., 3 tables, 3 refs., formula. **DWB**—Analysis of acceleration data in relation to radar observations (obtained during a transcontinental flight in July 1947) shows intensity of turbulence within a cloud: 1) that gives radar echo, 2) one that does not and 3) in the surrounding air. Difference in magnitude and frequency of gusts in the three flight areas does exist. *Subject Headings:* **Radar equipment, Radar storm detection, Turbulence.**

2H–123 551.501.81

U. S. Navy, Aerological Service, **Typhoon reconnaissance: Meteorological Squadron One: May through November 1947.** Washington, D. C., Chief of Naval Operations, Aerology Flight Section, Jan. **1948.** 254 p. numerous charts, graphs, photos. At head of title: NAVAER 50-IR-206A. **DLC**—A compilation of reports by the U. S. Pacific Fleet Air Force, Meteorological Squadron One. Fifteen typhoons are plotted and analyzed. Application of radar is shown in an analysis of radar scope as well as pictures of the radar scope while the aircraft is within the eye of a typhoon and circumnavigating its southeast quadrant. *Subject Headings:* **Radar storm detection, Radar observation, Radar echoes, Typhoons, Radar photographs.**

2H–124 551.501.81:551.577.37

Wexler, Raymond, **Rain intensities by radar.** *Journal of Meteorology*, 5(4):171–173, Aug. **1948.** fig., 8 refs., 7 equations. **MH-BH**—The relation between raindrop size and strength of signal return on radar scope is constant enough to give fairly accurate results in estimation of rainfall intensity from signal strength. Various empirical formulas are given and accuracy of results of their use discussed. *Subject Headings:* **Radar echoes, Radar observation, Rainfall intensity.**

2H–125 551.578.1:551.594.71(73)

Wexler, Raymond and Weinstein, Joseph, **Rainfall intensities and attenuation of centimeter electromagnetic waves.** *Institute of Radio Engineers, Proceedings*, 36(3):353–355, March **1948.** 2 figs., table, 7 refs. **DLC**—An analysis of the rain frequency and intensity from four stations in the United States and an areal study to determine the rain attenuation of an X-band radar. *Subject Headings:* **Microwave attenuation, Rainfall data, Radar equipment, United States.**

2H–126 551.501.81:551.515.4

White, Fred D., **The Thunderstorm Project: operational report on phase II.** *American Meteorological Society, Bulletin*, 29(4):192–194, April **1948.** fig., 3 refs. **MH-BH**—Very brief report. The most interesting data were those obtained by the P-61 (Black Widow aircraft) which made 812 flights through all phases of thunderstorms in Ohio. The bright line was investigated on several of these flights. *Subject Headings:* **Radar storm detection, Radar echoes, Thunderstorms, Bright band echoes.**

1949

2H–127 551.501.81:551.515.4

Byers, Horace R., **Principal results of a comprehensive investigation of the structure and dynamics of the thunderstorm.** *Tellus*, 1(4):6–17, Nov. **1949.** 5 figs., 16 refs. **DWB**—Results of a comprehensive investigation of thunderstorm structure made in Florida and Ohio by means of airplane, radar, balloon and surface networks. New model of thunderstorm in cumulus, mature and dissipating stage, is presented. Also discussed and illustrated graphically are: entrainment mechanism, surface weather (rainfall, wind field, temperature, pressure, humidity) cellular development, electric fields, radar records, effect of prevailing air circulation, preferred areas for development and squall lines. (*Same abstract* as No. 4–66 in April 1950 *Meteorological Abstracts.*) *Subject Headings:* **Radar storm detection, Radar echoes, Thunderstorms, Radar equipment.**—*M.R.*

2H–128 551.501.81:551.556:551.515.4

Byers, Horace R. and Battan, L. J., **Some effects of vertical wind shear on thunderstorm structure.** *American Meteorological Society, Bulletin*, 30(5):168–175, May **1949.** 7 figs., 10 refs., equations. **MH-BH, DWB**—Effects of wind shear on the structure of the thunderstorm are investigated by means of radar observations and analysis. (*Same abstract* as No. H–206 in August 1950 *Meteorological Abstracts.*) *Subject Headings:* **Radar storm detection, Radar echoes, Thunderstorms.**—*H. P. K.*

2H–129 551.501.81:551.515.4

†*Byers, Horace R. and Braham, Roscoe, R., Jr., **The thunderstorm: report of the Thunderstorm Project.** Washington, U. S. Govt. Print. Off., June **1949.** Price $2.25. 287 p. 254 figs., 49 tables, 63 refs., append. **MH-BH, DLC**—This final report of the Thunderstorm Project gives numerous PPI scope photographs as illustrations of various phases of thunderstorm physics and observation. On p. 270–272 ground and airborne radar equipment used in Florida (1946) and Ohio (1947) is described and illustrated. Photographic devices used for making records of PPI, RHI and the SCR-718 and 720 scopes are described and illustrated in a subsequent section of the appendix (p. 279–282). (*Same item* as No. 6–46 in June 1950 *Meteorological Abstracts.*) *Subject Headings:* **Radar storm detection, Thunderstorms, Radar echoes, Radar photographs, Radar equipment.**

2H–130 551.501.81:551.515.411

Byers, Horace R. and Hull, Edwin C., **Inflow patterns of thunderstorms as shown by wind aloft.** *American Meteorological Society, Bulletin*, 30(3):90–96, March **1949.** 9 figs., 9 refs. **MH-BH**—Balloons ascending simultaneously at various points around thunderstorms are followed by radar or radio-direction finders (rawins and rawin-sondes) to determine horizontal inflow or outflow of the air. It is found that in the early stages of development of a thunderstorm cell, inflow or horizontal convergence is present at the ground as well as all heights reached by the cloud. In a mature thunderstorm cell, the observations show outflow or horizontal divergence under the cloud base and convergence at all heights between about 4,000 and 23,000 feet, with divergence again in the uppermost levels. Relationships to rainfall and to cloud entrainment of environmental air are shown. (*Same item* as Nos. 2–93 in Feb. and H–203 in Aug. 1950 *Meteorological Abstracts.*) *Subject Headings:* **Radar observation, Radar storm detection, Thunderstorms.**—*Author's abstract.*

2H–131 551.508.85:551.509.67

*Coons, Richard D., Jones, Earl L. and Gunn, Ross, **Fourth partial report on artificial production of precipitation: Cumulus clouds, Gulf States, 1949.** *American Meteorological Society, Bulletin*, 30(8):289–292, Oct. **1949.** 3 tables, 4 refs. **MH-BH**—A paper dealing with the 44 seedings into 39 cumulus clouds made during May and June 1949. The results are presented in tables. Airborne and ground radar was used to check conditions of clouds and development. (*Same item* as No. C–173 in March 1950 *Meteorological Abstracts*.) *Subject Headings:* **Radar equipment, Radar observation, Cumulus clouds, Artificial precipitation.**

2H–132 551.501.8:621.396

Crawford, A. B., **Radar reflections in the lower atmosphere.** *Institute of Radio Engineers, Proceedings*, 37(4):404–405, April **1949.** 2 figs., 4 refs. **DLC**—Reflections from the lower atmosphere might be due to insects or birds, as experiments to synthesize "angels" failed; visual observations of insects coincide with radar observations. *Subject Headings:* **Radar observation, Radar echoes, Lower atmosphere, False echoes, Insects, Birds.**

2H–133 621.396:523.3

Dewitt, John H., Jr., **Detection of radar signals reflected from the moon.** *Institute of Radio Engineers, Proceedings*, 37(3):229–242, March **1949.** 18 figs., 4 refs., 36 equations. **DLC**—A paper dealing with the results of radar echoes from the moon on the basis of the experiments at the Evans Signal Laboratory. An experimental moon radar set is described along with formulas and curves showing attenuation between transmitting and receiving antennas. *Subject Headings:* **Radar observation, Radar echoes, Moon, Radar equipment.**

2H–134 551.508.85:551.508.762

Gould, William B., **Cloud detection by radar.** Belmar, N. J., Signal Corps Engineering Laboratory, [1949?]. 3 p. 9 figs. **MCM**—A novel device, the "cloud base and top indicator," is discussed. It may become valuable to meteorologists. *Subject Headings:* **Radar equipment, Radar echoes, Cloud detection.**

2H–135 551.508.85:551.577

*Hilst, Glenn Rudolph, **Analysis of the audio-frequency fluctuations in radar storm echoes: A key to the relative velocities of the precipitation particles.** *Massachusetts Institute of Technology, Dept. of Meteorology, Weather Radar Research, Technical Report* No. 9, Pt. A, Nov. 1, **1949.** 68 p. 26 figs., 3 plates, table, 9 refs., 4 equations, append. **DWB**—A paper devoted to observations of relative motions among precipitation particles. The RASAPH used in the observation was built at M.I.T. in 1944–45 and modified for use with the SCR-615-B radar in 1946. Description of RASAPH is given. From the experimental results of observations there are reasons to believe that: 1) frequency of fluctuation in the return radar signal is a direct measure of the relative velocity between targets, and 2) that RASAPH is able to measure the velocity of precipitation particles. However, due to incompleteness of the investigations, author's conclusions are not definite. *Subject Headings:* **Radar equipment, Radar echoes, Precipitation, Radar observation, Microwave propagation.**

2H–136 551.501.8:551.508.57

Hopkins, H. G. and Horner, F., **Direction-finding site errors at very high frequencies.** *Institution of Electrical Engineers, Proceedings*, Pt. III, 96(42):321–332, July **1949.** 12 figs., table, 14 refs., 5 equations, append. **DLC**—Techniques for locating the effective reflecting obstacles are described and exemplified. The investigations largely arose from the development of the radio wind-finding techniques of the Meteorological Office in London. *Subject Headings:* **Radar observation, Radar echoes, Reflections, Radio wind measurement.**

2H–137 551.508.85:551.501.8

Jones, F. E., **Radar as an aid to the study of the atmosphere.** *Royal Aeronautical Society, Journal*, 53(461):433–442, May **1949.** 9 figs., 6 refs., equations. Discussion p. 442–448. **DLC**—The radar's capabilities and limitations as a meteorological tool are discussed by several prominent scientists. *Subject Heading:* **Radar equipment.**

2H–138 551.594.7:551.515.23

Latour, Marinus H. and Bunting, Donald C., **Radar observation of Florida hurricane, Aug. 26–27, 1949.** *Florida University, Engineering and Industrial Experiment Station, Engineering Progress*, 3(8), *Bulletin Series* No. 29, Oct. **1949.** 11 p. 8 figs., 14 refs. **DLC**—At intervals of 30 seconds, more than 2,500 radar scope photographs were taken from which the rate of movement of the hurricane was computed. *Subject Headings:* **Radar storm detection, Radar echoes, Hurricanes, Radar photographs.**

2H–139 551.508.85:551.501.83:551.515.4

Location of thunderstorms by radio. *Nature*, London, 163(4132):75, Jan. 8, **1949.** 4 refs. **DWB**—Storm location network of the Meteorological Office in the British Isles and "sferics" apparatus employed are described. *Subject Headings:* **Radio equipment, Radio echoes, Thunderstorms, Radar storm detection, Sferics.**

2H–140 551.590.25:621.396.826

McKinley, D. W. R. and Milkman, Peter M., **A phenomenological theory of radar echoes from meteors.** *Institute of Radio Engineers, Proceedings*, 37(4):364–375, April **1949.** 10 figs., 3 tables, 17 refs. **DLC**—Data of the combined visual, photographic and radar observations of meteors at the Dominion Observatory and the National Research Council, Ottawa, Canada, are summarized and general conclusions drawn. A phenomenological theory of the mechanics of radar reflections from meteors is proposed, in which a qualitative explanation for all observed echo forms is advanced, and which is consistent with results obtained by other investigators for different wave lengths. *Subject Headings:* **Radar echoes, Meteors, Canada.**

2H–141 551.501.8:551.508.85(02)

Manual of radar meteorological observations. Circular N. 6th ed. U. S. Weather Bureau, Aug. 1, **1949.** Chap. 15. 23 p. 9 figs., tables. Mimeographed. **DWB**—After a general survey of radar equipment used, operational instruction is given on detection and evaluation of echoes, the latter broken down into individual characteristics. A variety of observational forms and their application are included. Illustrations are well explained. *Subject Headings:* **Radar observation, Radar storm detection, Radar echoes, Radar equipment, Manuals.**

2H–142 551.501.8:551.515.8

Mather, John R., **An investigation of the dimensions of precipitation echoes by radar.**. *American Meteorological Society, Bulletin*, 30(8):271–277, Oct. **1949.** 4 figs., 4 tables, 8 refs. **MH-BH**—Author carried out these studies of the echo size in 1948 at M.I.T. It was found that: 1) during cold frontal situations, the average echo is greater in vertical thickness and smaller in horizontal diameter than during warm frontal situations and 2) with increasing instability of the air mass the cells become larger, vertically and horizontally. *Subject Headings:* **Radar echoes, Precipitation.**

2H–143 551.501.8:551.557:551.510.535

Mitra, S. N., **A radio method of measuring winds in the ionosphere.** *Institution of Electrical Engineers, Proceedings*, Pt. III, 96(43):441–446, Sept. **1949.** 10 figs., 14 refs., 8 equations. **DLC**—If a steady wind is blowing in a nonturbulent ionosphere, the fading of a single reflected radio pulse that is simultaneously recorded on three receivers separated by distances of the order of 100 m. and placed in the corners of a right-angled triangle, will cause the displacement of the three fading records in time. Consequently, velocity and direction of wind can be deduced. *Subject Headings:* **Radio observation, Radio equipment, Radio echoes, Upper wind measurement.**

2H–144 551.501.8:551.578.11

Perrie, D. W., **The rain required for a radar echo.** *American Meteorological Society, Bulletin*, 30(8):278–281, Oct. **1949.** 3 figs., 7 refs. **MH-BH**—Describes measurements and gives data on rains that give radar echoes and rains that do not. By comparison with the filter paper technique, the experiments show that less than approximately 100 drops caught in 5 sec. do not give radar echoes. *Subject Headings:* **Radar echoes, Raindrops, Canada.**

2H–145 551.501.81:551.508.85

[Photographic coverage of storms and pulse integrator measurements with a 615-B set.] *Massachusetts Institute of Technology, Dept. of Meteorology, Weather Radar Research, Progress Report*, No. 13, [Feb. 14, **1949**]. 9 leaves. 35 refs. Mimeographed. **DLC**—A general review of the work carried out during the period Nov. 15, 1948 through Feb. 14, 1949. A moving picture that shows growth and movement of storm cells, as seen on the TPS-10's RHI, is under preparation. Pulse integrator measurements with SCR-615-B are mentioned. *Subject Headings:* **Radar storm detection, Radar equipment, Radar echoes, Precipitation.**

2H–146 551.508.85:551.577

Podell, Robert, **Some radar studies of rain attenuation and the relation between precipitation rate and reflected power.** Thesis (B.A.)—Massachusetts Institute of Technology, **1949.** 25+ leaves. numerous figs., 4 tables, 16 refs., numerous equations. **MCM**—An attempt to determine rain attenuation at 3 cm. by comparisons between maximum range, as observed on the 3 cm. AN/TPS-10A radar, and reflected power measurements on the 10 cm. SCR-615-P radar. Author

concludes that too many errors are involved in accurate measurements of rain attenuation from maximum range observation. *Subject Headings:* **Radar echoes, Rain attenuation, Radar observation.**

2H–147 551.508.85:551.508.822

Radar and the weather. *Flight*, 55(2093):142–143, Feb. 3, **1949.** **DLC**—Short description of experiments at the T. R. E. with the improved "radar-sonde." The first experimental model used a chronometric unit. The angular deviation of the arms of the unit is measured in units of time. However, to comply with the meteorologists' requirement of accuracy (one part in one thousand) has proved difficult; hence, possibilities of an all-electronic unit are under investigation. Readings of the instruments are recorded automatically—on graph paper and teleprinter—at the ground station. *Subject Headings:* **Radar equipment, Radar observation.**

2H–148 551.508.85:551.515

Radar turned to weather forecasting. *Engineering News Record*, 142(7):58–59, Feb. 17, **1949.** 2 figs. **DLC**—Popular description for engineers for operation of radar in detecting storms, hurricanes, etc. Limitations due to curvature of earth and attenuation beyond 40 miles. Gives better coverage than raingage network for area of 8000 sq. miles. (*Same abstract* as No. 2–44 in Feb. 1950 *Meteorological Abstracts.*) *Subject Headings:* **Radar equipment, Radar storm detection.**

2H–149 551.501.8:621.396.826

Randall, A. W., Trout, C. C. and others, **Performance of S-band and L-band surveillance radars during rain and cloud conditions.** *U. S. Civil Aeronautics Administration, Technical Developments Report*, No. 92, Indianapolis, Indiana, **1949.** 8 p. 7 figs., table. **DLC**—Tests were conducted and results tabulated to show ratio of signal received on a PPI scope from aircraft and from rain or clouds. Equipment and observations illustrated. Methods of improving reception described. (*Same abstract* as No. 2.2–168 in Feb. 1951 *Meteorological Abstracts.*) *Subject Headings:* **Radar observation, Clouds, Rain, Bright band echoes, Radar equipment.**—*M.R.*

2H–150 551.501.81:551.578.1

†*Stout, Gleason Emanuel and Huff, F. A., **Radar and rainfall.** *Illinois, State Water Survey Div., Urbana, Report of Investigation*, No. 3, **1949.** 59+p. 35 figs., 20 refs., append. **DLC**—Pfister Hybrid Corn Company (El Paso, Ill.) and the State Water Survey Division, Ill., sponsored the study of radar and rainfall which is here reviewed. Although limited in area and operation, it is a valuable study. False rain echoes were observed. The radar equipment paid for itself by determining whether to send laborers out in the fields or not. Fairly detailed data are given. *Subject Headings:* **Radar storm detection, Radar echoes, Rain, False echoes.**

2H–151 551.501.81:551.577.1:629.135

A summary of the "in-flight" dangerous weather avoidance phase of the Navy-American airborne radar flight evaluation program. American Airlines, **1949.** 7 p. graphs, photos. **NACA** Library—Paper presented by F. C. White before the 101st Annual Meeting of the American Meteorological Society. Summarizes part of the program; accompanying photographs. (Abstract No. D-243 in April 1950 *Meteorological Abstracts.*) *Subject Headings:* **Radar storm detection, Radar observation.**—*M.L.R.*

2H–152 551.501.8:551.558.1:629.13

*Thompson, J. K. and Lipscomb, V. W., **An evaluation of ground radar for avoiding severe turbulence associated with thunderstorms.** *U. S. NACA, Technical Note* 1960, Oct. **1949.** 10 p. 2 figs., 3 tables, 3 refs. **DWB**—From this analysis, the authors conclude that turbulence can be reduced by avoiding storm areas as indicated by ground radar (10 cm.). The data presented indicate that ground radar is increasingly effective from 6000 up to 25,000 feet. (*Same item* as No. H–227 in Aug. 1950 *Meteorological Abstracts.*) *Subject Headings:* **Radar observation, Radar echoes, Radar storm detection, Turbulence.**

2H–153 551.501.81:551.515.3:551.594.6

Tornado prediction. *Newsweek*, 35(7):52, Aug. 15, **1949.** photo. **DLC**—Report of work being done at Oklahoma Institute of Technology, Stillwater, under the direction of Clark A. Dunn and H. L. Jones, on tracing and predicting tornadoes by radar, which records a different picture of tornado lightning than of ordinary lightning. It is believed that a growing tornado can be detected 100 to 200 miles away. A method for plotting a storm's course is being developed. (*Same abstract* as No. E–117 in May 1950 *Meteorological Abstracts.*) *Subject Headings:* **Radar storm detection, Radar echoes, Tornadoes, Lightning.**—*M.R.*

2H–154 551.508.85:621.396.826

U. S. Coast Guard, **Advantages and limitations of radar.** (In **Electronic navigational aids.** Washington, D. C., U. S. Govt. Print. Off., **1949.** p. 48–51. 2 PPI photos.) **DLC**—Brief outline of meteorological and oceanographical elements influencing reception. *Subject Headings:* **Radar equipment, Radar echoes.**

2H–155 551.501.8:551.578.4

Weinstein, Joseph, **Three-dimensional "bright line" representation.** *Journal of Meteorology*, 6(4):289, Aug. **1949.** 3 figs., 4 refs. **MH-BH**—In this brief contribution, the 3 radar photographs support the theory that echo returns above the bright line are caused by falling snow. *Subject Headings:* **Radar observation, Bright band echoes, Radar echoes, Snow.**

2H–156 551.578.1:621.396.9

Whalley, H. and Scoles, C. J., **Radar observations of heavy rain.** *Nature*, London, 163(4140): 372, March 5, **1949.** 5 figs. **DLC**—Description and illustration of a belt of rain 50 miles wide passing over Manchester, Nov. 19, 1948. (*Same abstract* as No. 3–110 in March 1950 *Meteorological Abstracts.*) *Subject Headings:* **Radar storm detection, Radar echoes, Rain.**—*M.R.*

2H–157 551.508.85:551.501.8:551.577

Williams, Edwin L., Jr., **The pulse integrator. Pt. A.: Description of the instrument and its circuity.** *Massachusetts Institute of Technology, Dept. of Meteorology, Weather Radar Research, Technical Report* No. 8, Aug. 1, **1949.** 35 p. 22 figs., table, ref. 5 equations. **DWB**—A detailed description and design of an instrument that measures and records the average peak amplitudes of a number of pulses for which peak values may be different. For two years another type of the instrument has been used at M.I.T. to measure accurately the signal strength of radar echoes from precipitation. *Subject Headings:* **Radar equipment, Radar echoes, Precipitation, Radar observation.**

2H–158 551.594.7:551.594.21

Workman, Everly J. and Reynolds, S. E., **Electrical activity as related to thunderstorm cell growth.** *American Meteorological Society, Bulletin*, 30(4):142–144, April **1949.** 7 refs. **DWB**—Twelve storm cells were studied. Visual and radar observations of electrical activity of clouds were carried out. Some tentative conclusions are presented. (*Same item* as No. H–231 in Aug. 1950 *Meteorological Abstracts.*) *Subject Headings:* **Radar observation, Radar echoes, Radar storm detection, Thunderstorms.**

2H–159 551.501.8:551.576.1

Workman, Everly J. and Reynolds, S. E., **Time of rise and fall of cumulus cloud tops.** *American Meteorological Society, Bulletin*, 30(10):359–361, Dec. **1949.** **DWB**—Description and analysis of data obtained from photography and radar measurements of convective cells or nodules rising from tops of cumulus clouds in New Mexico. It is shown that the cells subside with nearly the same speed as they develop and that the standard deviation is small for this type of activity. (*Same item* as No. 3–102 in March 1950 *Meteorological Abstracts.*) *Subject Headings:* **Radar observation, Radar echoes, Cumulus clouds, Convective cells.**—*M.R.*

2H–160 551.508.85:551.515

Zurcher, Lester A., **Storm detecting radar.** 30 p. 17 figs. Paper read before the joint meeting of American Geophysical Union and American Meteorological Society in Washington, D. C., April 20, **1949.** **MCM**—Description and photographs of a novel storm detecting radar, specially designed for weather forecasting. *Subject Headings:* **Radar equipment, Radar storm detection, Weather forecasting.**

1950

2H–161 551.501.8:551.577.1

†*Austin, Pauline M. and Bemis, Alan C., **A quantitative study of the "bright band" in radar precipitation echoes.** *Journal of Meteorology*, 7(2):145–151, April **1950.** 6 figs., 2 tables, 10 refs., equations. **MH-BH**—Selected cases of measurements of the bright band are presented. It is found that the bright band, associated with the freezing level, is caused by coalescence and melting of snow flakes but not by the formation of any new particles. (*Same item* as No. 7–129 in July 1950 *Meteorological Abstracts.*) *Subject Headings:* **Bright band echoes, Radar echoes, Precipitation, Snow flakes.**

2H–162 551.501.8:551.577.1

Atlas, David and Banks, Harold C., **A virtual echo-layer above the bright band.** *Journal of Meteorology*, 7(6):402–403, Dec. **1950.** 2 figs., 6 refs. **MH-BH**—With reference to AUSTIN and

BEMIS' article (*see item* No. 2H–161 above) authors have found a similar stratified echo-layer in a model of an idealized precipitation system with no associated layer of ice crystals or snow. The difference between the real meteorological and/or the virtual layer is pointed out. Whether a 3 cm. radar picture shows the one or the other might in some cases be difficult to determine. Reply by PAULINE M. AUSTIN and ALAN C. BEMIS, *ibid.*, p. 403–404. A theoretical case like that does not resemble a layer, but only a slight indentation above the bright band where the echo, at the borderline of detection, must be weak. (*See items* 2.4 199 and 2.4–200 in April 1951 *Meteorological Abstracts.*) *Subject Headings:* **Bright band echoes, Precipitation.**

2H–163 551.501.8:551.577.1

Austin, Pauline M. and Foster, Harrie E., **Note on comparison of liquid water content of air with radar reflectivity.** *Journal of Meteorology*, 7(2):160–161, April **1950.** fig., 6 refs., equation. **MH-BH**—The conclusion of this study is that each type of precipitation should be considered separately rather than averaging them together. (*Same item* as No. 11–134 in Nov. 1950 *Meteorological Abstracts.*) *Subject Headings:* **Radar echoes, Air masses, Precipitation.**

2H–164 551.501.8:551.577.37

Barden, S. E., **The effect of rain on marine radar echoes.** *Marconi's Review*, 13(98):102–109, **1950.** 4 figs., 2 tables. **DBS**—The peculiar inability of the marine radar system to detect targets in the vicinity (e.g., ships) during heavy rain is analyzed and explained. *Subject Headings:* **Radar echoes, Rain, Masking effects.**

2H–165 551.501.81:551.577.1

Bent, Arthur E., Austin, Pauline M. and Stone, M. L., **Beam width and pulse length in radar weather detection.** *Massachusetts Institute of Technology, Dept. of Meteorology, Technical Report* No. 12, Pt. A and B, Aug. 1, **1950.** 61 p. 19 figs., 10 refs., numerous equations, append. **MCM**—Part A is a qualitative survey of the factors involved in distortions of the display of precipitation areas by radar. Pt. B (p. 37–61) is entitled "A means of correcting radar measurements in the case of partially filled beams." Where the beam is but partially filled or where it intercepts two or more layers of different types of precipitation, the radar signal strength measurements require careful correction. A nomogram for computing the fraction of the radar beam below a given level is presented. *Subject Headings:* **Radar echoes, Precipitation, Radar observation.**

2H–166 551.501.8:551.556:551.465

Blake, Lamont V., **Reflections of radio waves from a rough sea.** *Institute of Radio Engineers, Proceedings*, 38(3):301–304, March **1950.** 6 refs., 5 equations. **DLC**—The radar "sea-return" presumably has properties similar to reflected CW signals. It is remarkable that "sea-return," as observed on a radar indicator, has the general appearance of a noise voltage. Possible practical significance of the results analyzed is discussed. *Subject Headings:* **Radar observation, Radar echoes from sea.**

2H–167 551.508.85:551.576:629.135(04)

BOAC Comet to get search radar. *Aviation Week*, 53(7):48, 51, Aug. 14, **1950.** 5 fig. **DLC**—Popular, brief article on the ECKO cloud and warning radar equipment, primarily built for detection of cumulonimbus clouds in order to avoid turbulence. This radar is also used for high ground obstacles and as an aid for navigation by "map-painting." *Subject Headings:* **Radar equipment, Radar echoes, Clouds, Map-painting.**

2H–168 551.501.8:551.515.2

Brown, Andrew H., **Men against hurricane.** *National Geographic Magazine*, 98(4):537–560, Oct. **1950.** 21 photographs. **DLC**—Detection and warning of hurricanes by means of airborne and ground radars on the coast of Florida. Excellent photographs, of which one radar photograph taken at the Boca Chica Naval Air Station near Key West, Florida, shows the spiral structure of an approaching hurricane about 30 miles away. *Subject Headings:* **Radar observation, Radar photographs, Hurricanes, Radar echoes.**

2H–169 551.501.8:551.578.1

*Clem, LeRoy H. and Moxon, George W., **Banded structures in radar precipitation echoes.** Thesis (M.A.)—Massachusetts Institute of Technology, May **1950.** 44 leaves. 30 figs., 22 tables, 8 refs., append. Typewritten. **MCM**—A study of the banded structure (i.e., the parallel patterns of precipitation echoes) observed on the PPI and the RHI scopes. The first part consists of a study of the data. The second part discusses some proposed theories in the light of empirical evidence. *Subject Headings:* **Radar observation, Radar echoes, Precipitation.**

2H–170 551.501.81:551.508.85

Cloud and collision. BOAC experiments with search radar. *Shell Aviation News*, 140:9–11, Feb. **1950.** 4 figs. **DLC**—An article devoted to the usefulness of an airborne ECKO radar in the Singapore area. Cunb cores could be detected up to 40 miles and more. For map-painting the success depends upon terrain, altitude of the aircraft and angle of the scanner. Shipping on rivers may at times confuse the pilot who depends on his radar. On one occasion, vessels in midstream completely eliminated all trace of the river. Photographs present radar and visual images. The article is based, to a large extent, on an interim report by Captain H. T. FIELD of BOAC's Operational Development Unit. *Subject Headings:* **Radar echoes, Cumulonimbus clouds, Masking effects, Radar equipment.**

2H–171 551.508.85:551.507.352

Dresios, Harry C., **Instrumentation of a B-17 aircraft for weather radar flights.** *Massachusetts Institute of Technology, Dept. of Meteorology, Weather Radar Research, Technical Report* No. 10, March 1, **1950.** 87 p. 29 figs., 36 plates, 7 refs. **DWB**—A clear description of all instruments used aboard the "flying weather station" B-17. Excellent illustrations. *Subject Headings:* **Radar equipment, Mobile weather stations.**

2H–172 551.501.81:551.508.85

Gerdes, W. F. and Jorgensen, R. C., **Industrial radar for hurricane tracking.** *Instruments*, 23(1):72–76, Jan. **1950.** 7 figs., 6 refs. **DLC**—A paper presented before the fourth annual conference of the Instrument Society of America, Sept. 12–16, 1949 in St. Louis. The value of radar in general, and to a chemical corporation on the Texas Gulf Coast in particular, is discussed. *Subject Headings:* **Radar storm detection, Radar echoes, Hurricanes.**

2H–173 551.501.8:551.557

Gormley, P. M., **High weather.** *Aero Digest*, 61(5):30–31, 105–107, Nov. **1950.** 5 figs. **DLC**—Methods of determining winds at very high altitudes are discussed and illustrated. Balloons reach 100,000 ft. and rockets 250 miles (the latter are useless for determining winds). Observations of noctilucent clouds or of meteor trails give occasional information on winds at certain altitudes, but recent measurements of the movement of sporadic E layer ionic drift have given more consistent results. Radar reflections from drifting meteoric dust clouds give a Döppler effect (interference), arising from winds of high speeds in the stratosphere. Methods used for measurements of ionic or meteoric drift by radar are shown diagrammatically. (*Same abstract* No. as 2.4–117 in April 1951 *Meteorological Abstracts.*) *Subject Headings:* **Radar observation, Radar echoes, Meteoric dust clouds, Radar equipment, Upper air winds.**—*M.R.*

2H–174 551.501.8:551.515.4

*Hilst, G. R. and MacDowell, G. P., **Radar measurements of the initial growth of thunderstorm precipitation cells.** *American Meteorological Society, Bulletin*, 31(3):95–99, March **1950.** 4 figs., table, 4 refs. **DWB, MH-BH**—A thunderstorm near Cambridge, Mass., which spread steadily but rapidly in a horizontal plane and which developed vertically at a rate of 1,000 ft./min. during the first 10 minutes, was studied by means of PPI and RHI scope photographs and by in-flight measurements of vertical gusts, drafts and liquid water content. Extreme turbulence was encountered (adjacent effective gusts of +17 and +22 ft./sec.). Data presented effectively in charts and graphs. (*Same abstract* as No. 6–47 in June 1950 *Meteorological Abstracts.*) *Subject Headings:* **Radar storm detection, Radar echoes, Thunderstorms, Radar photographs, Radar observation.**—*M.R.*

2H–175 551.577.11:621.396.9

Hooper, J. E. N. and Kippax, A. A., **The bright band—a phenomenon associated with radar echoes from falling rain.** *Royal Meteorological Society, Quarterly Journal*, 76(328):125–132, April **1950.** 3 figs., 5 tables, 7 refs. **DWB**—Frontal rain traversed by a vertical radar beam gives a bright band due to an echo 5 to 9 times the strength below and above. The band is 300–400 ft. below freezing level. It is attributed to the level at which snowflakes have melted but water drops have not reached their terminal velocity. Calculations from velocity of fall of snowflakes and resultant water drops show that magnitude of echo confirms this explanation. Bright line is less pronounced from instability showers. (*Same item* as 9–112 in Sept. 1950 *Meteorological Abstracts.*) *Subject Headings:* **Bright band echoes, Radar echoes, Rain, Water drops.**—*C.E.P.B.*

2H–176 551.501.81:551.577

Hooper, J. E. N. and Kippax, A. A., **Radar echoes from meteorological precipitation.** *Institution of Electrical Engineers, Proceedings*, Pt. I, 97(105):89–95, May **1950.** 5 figs., 6 tables, 7 refs., 10 equations. Discussion by Dr. R. A. Smith p. 95–97. **DLC**—A brief, well-illustrated article reviewing

recent investigations of the theory, apparatus and application of radar techniques to detection of rain, snow and storms for research into the physics of storms, precipitation, etc. and for short range forecasting. Cause of bright band echo discussed. (*Same abstract* as No. 9–17 in Sept. 1950 *Meteorological Abstracts.*) *Subject Headings:* **Radar storm detection, Radar echoes, Precipitation, Bright band echoes, Radar observation.**—*M.R.*

2H–177 551.508.85:551.501.83:551.515.3

Jones, Herbert L., **The identification and tracking of tornadoes.** Paper read at the Joint Meeting of the International Scientific Radio Union and Institute of Radio Engineers. Washington, D. C., April **1950.** 12 figs. Mimeographed. **DWB, MH-BH**—Research work at Oklahoma A. and M. indicates the possibility of identifying and tracking tornadoes by means of characteristic lightning discharges. Evidence shows that electrical discharges from tornadoes are very different from discharges observed during an ordinary thunderstorm; the tornado discharges are reputed to be more violent with an energy concentration in the blue end of the spectrum. Sferics during a tornado are observed to be much greater in magnitude than sferics resulting from other types of storms. New electronic equipment has been developed for recording only those sferics above a given preset level. Direction indicating equipment has also been assembled for trial in spring of 1950. (*Same abstract* as E-125 in May 1950 *Meteorological Abstracts.*) *Subject Headings:* **Radar equipment, Radar storm detection, Radar echoes, Tornadoes, Lightning, Sferics.**—*H.P.K.*

2H–178 551.501.81:551.510.42

Jones, R. F., **Radar echoes from smoke.** *Meteorological Magazine*, London, 79(933, 937):80, 89–90, 201, 207, March, July **1950.** 2 photos. **MH-BH**—Radar picked up a bright PPI display caused by a fire, approximately 5 miles away. The second photograph shows the cumulus cloud (smoke) that produced the radar echo. *Subject Headings:* **Radar echoes, Smoke, Radar photographs.**

2H–179 551.501.8:621.396.621

Jones, R. F., **Radar weather echoes, Pt. I–IV.** *Meteorological Magazine*, London, 79(934–937): 109–112, 143–145, 170–172, 198 200, April–July **1950.** 23 photos, 12 refs. **MH-BH**—Pt. I and II. Energy backscattered to radar receiver is proportional to ΣND^6, where N is number of drops of diameter D. At distances greater than 10 miles, echo comes from raindrops or ice crystals. Photographs are reproduced from plan position indicator and height-range tube near Dunstable. They show plans and vertical cross sections of cold and warm fronts. Typical cold fronts show a long narrow (5–10 miles) band with columnar structure. Warm front plans show much wider areas of rain; in cross section they show a bright band near freezing level, whole remainder is diffuse and free from columnar structure. Pt. III. Radar PPI of occlusions indicates that up currents are widespread and fairly uniform in strength. Vertical sections usually resemble warm front echoes rather than cold but are sometimes complex and not capable of being represented by a simple model. Pt. IV, "Unusual weather echoes," describes and illustrates (a) wave on a cold front; (b) large ice crystals due to convergence over a wide area; (c, d) precipitation falling from altocumulus; (e) isolated thunderstorm; (f) degenerating thunderstorms. (*Same abstract* as No. 9–71 in September 1950 *Meteorological Abstracts.*) *Subject Headings:* **Radar observation, Radar echoes, Rain, Cold fronts, Warm fronts, Bright band echoes, Ice crystals, Radar photographs.**—*C.E.P.B.*

2H–180 551.501.8:621.396.826

Jones, R. F., **The temperatures at the tops of radar echoes associated with various cloud systems.** *Royal Meteorological Society, Quarterly Journal*, 76(329):312 330, July **1950.** 5 figs., 4 tables, 12 refs. Discussion p. 330–336. **MH-BH**—Discussion of 1,200 photographs of radar echoes. Temperatures at tops of 164 echoes estimated (frequency table given). From associated weather types it is concluded that temperature at top of an echo gives good indication of strength of vertical currents. It is suggested that in strong vertical currents rain forms without assistance of ice crystals. The strong echoes from thunderstorms are tentatively explained. (*Same abstract* as No. 9–89 in Sept. 1950 *Meteorological Abstracts.*) *Subject Headings:* **Radar observation, Radar echoes, Clouds, Thunderstorms, Radar photographs.**—*C.E.P.B.*

2H–181 551.501.81:551.515.4

Jones, R. F., **Thunderstorm tracks by radar.** *Weather*, 5(6):224–225, June **1950.** 12 photos. **DWB**—Ten photographs of radar PPI and two of vertical section during thunderstorms of 13 July 1949. (*Same abstract* as No. 10–18 in October 1950 *Meteorological Abstracts.*) *Subject Headings:* **Radar storm detection, Radar echoes, Thunderstorms, Radar photographs.**—*M.R.*

2H–182 551.510.535:621.396.812

Khastgir, S. R. and Das, P. M., **Periodic fading of short-wave radio signals.** *Physical Society of London, Proceedings*, 63(11):924–930, 371 B, Nov. **1950.** 5 figs., 7 refs., 2 equations. **DLC**—

Periodic fading patterns recorded photographically on Calcutta signals (4840 kc./s.) at 240 km. show 3 types: sinuous fading of quick period, slow periodic fading and the latter with superposed ripples. Physical explanation given. *Subject Headings:* **Ionosphere, Radio echoes, Radio communication.**—*C.E.P.B.*

2H–183 551.501.81:551.594.21

†*Küettner, Joachim, **The electrical and meteorological conditions inside thunderclouds.** *Journal of Meteorology*, 7(5):322–332, Oct. **1950.** 12 figs., 25 refs. **DWB, MH-BH**—Discussion of the results of observations of 67 thunderstorms and 58 shower clouds that were carried out at the Zugspitze Observatory (10,000 ft. a. s.) in Germany during the years of 1945–1948. Eighty per cent of these observations were made inside the clouds. *Subject Headings:* **Radar storm detection, Radar echoes, Thunderstorms, Clouds, Radar observation.**

2H–184 551.501.81:551.515.4

Ligda, Myron G. H., **Lightning detection by radar.** *American Meteorological Society, Bulletin*, 31(8):279–283, Oct. **1950.** 6 figs., 4 refs. **MH-BH**—A method of lightning detection by radar was worked out in 1945 by U. S. Air Weather Service observers. The Weather Radar Project of M.I.T. verified conclusions of Sweeny and Peterson and took the first radar photographs of lightning strokes. Equipment described and PPI scope of SCR-615-B radar reproduced. Value lies in ability to locate cells in a cloud mass which are electrically active. (*Same abstract* as No. 2.3–174 in March 1951 *Meteorological Abstracts.*) *Subject Headings:* **Radar storm detection, Radar echoes, Lightning, Radar photographs, Radar equipment, Radar observation.**—*M.R.*

2H–185 551.594.71:621.396.821

Lugeon, Jean, **L'essor de la radiométéorologie mondiale et la prévision du temps.** [The progress of world radio meteorology and weather forecasting.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 3(1–2):120–138, **1950.** 2 figs. **MH-BH**—A general survey of the work from 1920 up to now on the relations between sferics and synoptic meteorology. The problem of transmission of radio-meteorological results by code is discussed. (*Same item* as No. 2.2–169 in Feb. 1951 *Meteorological Abstracts.*) *Subject Headings:* **Radio propagation, Sferics, Radio communication, History of meteorology.**

2H–186 551.508.85:551.557

†*Manning, L. A., Villard, O. G. and Peterson, A. M., **Meteoric echo study of upper atmosphere winds.** *Institute of Radio Engineers, Proceedings*, 38(8):877 883, Aug. **1950.** 10 figs., 12 refs., 11 equations. **DLC**—A method involving a specially constructed meteor direction finder, for measurements of the wind velocity in the 90–110 km. region of the atmosphere, is described. Average velocity was found to be 125 km. per hour with S-SW and N directions most common. *Subject Headings:* **Radio equipment, Radio echoes, Ionospheric winds, Radar observation.**

2H–187 551.501.81:016

†[**A report covering period from Feb. 15–March 14, 1950.**] *Massachusetts Institute of Technology, Dept. of Meteorology, Weather Radar Research, Progress Report* No. 18, [May 14, **1950**]. 14 p. fig. **MCM**—This report includes a bibliography (44 entries) classified as follows: (1) progress reports, (2) technical reports, (3) papers and publications, (4) theses, (5) miscellaneous, (6) reports in preparation by M.I.T. Weather Radar Research, and (7) papers intended for publication being prepared by members of M.I.T. Weather Radar Research. *Subject Headings:* **Radar storm detection, Bibliographies.**

2H–188 551.501.81

Investigation of problems of weather radar. *Massachusetts Institute of Technology, Dept. of Meteorology, Weather Radar Research, Progress Report* No. 19, [Aug. 14, **1950**]. 7 leaves. 44 refs. **MCM**—During the quarter, 13 weather flights were made as well as 7 dry flights. Types of observations made comprise: radar signal intensity vs. liquid water content, heavy rain and turbulence measurements in thunderstorms, radar bright band observations with various checks and measurements aiming to solve the "disrometer" problems. *Subject Headings:* **Radar storm detection, Radar echoes, Thunderstorms, Bright band echoes, Radar observation.**

2H–189 551.508.85:551.509

Milburn, K., **Radar in ocean weather ships.** *Marine Observer*, 20(147):40–44, 55, 56, Jan. **1950.** 2 figs. **DWB**—General review of the use of radar. Synoptic forecasting in the North Atlantic is limited in detail, yet of importance to aircraft due to localization of fronts and presence of thunderstorms. (*Same item* as No. 5-18 in May 1950 *Meteorological Abstracts.*) *Subject Headings:* **Radar equipment, Radar storm detection, Weather forecasting, North Atlantic Ocean.**

2H–190 551.594.71:621.396.812

Milnes, B. and Unwin, R. S., **A radio meteorological investigation in the South Island of New Zealand.** *Physical Society of London, Proceedings*, B, 63, Pt. 8(368B):595–616, Aug. 1, **1950.** 26 figs., 9 refs. **DWB**—When föhn winds blow out over the sea in the vicinity of Canterbury Bight (South Island, New Zealand) they have a temperature of 12 to 20° or even 30°F. higher than the sea surface temperature and a corresponding deficit in humidity. The resulting inversion has a pronounced effect on radio transmission, as shown by these studies. Both the meteorological factors and the transmission measurements (refractive index) are carefully analyzed and shown in diagrams and cross sections, including a synoptic chart for Aug. 5, 1947, and lapse rate and field strength contour charts are given for other specific periods. (*Same abstract* as 2.5–52 in May 1951 *Meteorological Abstracts*.) *Subject Headings:* **Radio transmission ducts, Superrefraction, New Zealand.**—*M.R.*

2H–191 551.501.81:551.515

*Ostergaard, Paul Blume, **Motion of storm cells as seen by the radar.** Thesis (M.A.)—Massachusetts Institute of Technology, May 19, **1950.** 20 leaves. 6 graphs, 5 tables, 4 refs., equation, append. Typewritten. **MCM**—A study of the motion of the individual cells comprising fronts and showers. Using data of the Weather Radar Research Project at M.I.T., author attempts to correlate the direction and velocity of the cells, as seen on the radar, with the same quantities for various levels in the atmosphere. *Subject Headings:* **Radar storm detection, Radar echoes, Precipitation, Radar observation.**

2H–192 551.508.85(04):551.576

Radar cloud detector. *Wireless World*, 56(12):459–461, Dec. **1950.** 4 figs. **DLC**—Brief note on a radar detector of cumulonimbus clouds, particularly of interest to air navigation for avoiding turbulence. *Subject Headings:* **Radar equipment, Radar echoes, Cumulonimbus clouds.**

2H–193 551.501.81:551.515.2

Radar tracks hurricanes—Results promise aid in system operation. *Electrical World*, 133(17): 91–93, April 24, **1950.** 5 photos. **DLC**—Radar has been used since June 1948 by the Dow Chemical Co. for detecting hurricanes approaching its Freeport, Texas, plant. This plant must start closing 12 hours before the hurricane strikes, so that it will be shut down during the storm. Advance and accurate warnings save "false alarm" shutdowns which are costly. Three other such hurricane warning installations are mentioned: (1) the Humble Oil Co. (Louisiana), (2) Univ. of Florida and (3) U. S. Weather Bureau at Miami. All are operated under direction of HARRY WEXLER. Radar not as useful in detecting storms inland. (*Same abstract* No. as 9–18 in Sept. 1950 *Meteorological Abstracts*.) *Subject Headings:* **Radar storm detection, Radar echoes, Hurricanes, Radar observation.** —*M.R.*

2H–194 551.501.81:551.515.2

†§Rodewald, M., **Neue Einblicke in die Taifune.** [New views concerning typhoons.] *Naturwissenschaften*, 37(22):518–522, Nov. **1950.** 9 figs., 37 refs. **DWB**—A brief report listing new and unusual opinions, advanced by meteorologists throughout the world, regarding typhoon characteristics and typhoon analysis—conclusions made possible largely through the analysis of radar, radiosonde and aircraft data obtained in recent years. Illustrative charts are included. (*Same abstract* as No. 2.4–84 in April 1951 *Meteorological Abstracts*.) *Subject Headings:* **Radar storm detection, Radar echoes, Typhoons.**—*R.S.Q.*

2H–195 551.5:656.6:621.396

Satow, P. G., **Marine navigation; radar, meteorology and charts.** *Marine Observer*, 20(149):158–167, July **1950.** 2 figs., photo. **MH-BH**—Includes notes on sub-refraction due to meteorological causes. (*Same abstract* as No. 10–7 in Oct. 1950 *Meteorological Abstracts*.) *Subject Headings:* **Radar equipment, Marine meteorology.**

2H–196 551.501.8:551.578.11

Smith, E. J., **Observation of precipitation with an airborne radar.** *Australian Journal of Scientific Research, Ser. A, Physical Sciences*, 3(2):214–223, June **1950.** 14 figs., 5 refs., 2 photos, 2 tables. **MH-BH**—A SCR 717 10 cm. radar, its beam directed downward and mounted underneath an airplane, is used in observations of natural and artificially induced precipitation, providing information on origin and growth of the precipitation within a cloud. Use of the equipment is illustrated by an example of cloud seeding precipitation. (*See item* No. 2.8–43.) *Subject Headings:* **Radar observation, Radar echoes, Precipitation, Radar equipment, Artificial precipitation, Australia.**

2H–197 551.515.3:551.594.7

Tepper, Morris, **Radar and synoptic analysis of a tornado situation.** *Monthly Weather Review*, 78(9):170–176, Sept. **1950.** 7 figs., 2 tables, 4 refs. **MH-BH**—Author's theory, previously pub-

lished, that "the interacting zone of two intersecting pressure jump lines is a preferred region for tornado formation" is supported by the synoptic analysis and radar observations of the storm of Nov. 14, 1949 at Pierson, Fla. The verification of the theory by microbarograph data is explained. Excellent radar pictures show movement of storm. *Subject Headings:* **Radar storm detection, Radar echoes, Tornadoes, Radar photographs.**

2H–198 551.501.8:621.396.621

Unusual report on radar performance from the T. S. S. Clan Davidson on a voyage from Suez to Aden. *Marine Observer*, 20(150):212–216, Oct. **1950.** figs., **MH-BH**—Distinct, firm and constant false echoes were observed although no objects were seen—the visibility being good. DR. HOPKINS suggests the possibility of birds, indirect echoes and aircraft. LE PAGE mentions 3 possible causes and finally the Meteorological Office confirms that superrefraction probably was present at the time of observation. (*Same item* as No. 2.2–172 in Feb. 1951 *Meteorological Abstracts.*) *Subject Headings:* **Radar echoes, False echoes.**

2H–199 551.508.85:629.135

White, F. C., **Radar for dangerous weather avoidance.** *Institute of Navigation, Journal, Supplement*, 2(8), Dec. **1950.** [n.p.] 16 figs., 3 graphs. **MH-BH**—A paper read before the joint ION, RTCA, RTCM meeting in New York, Sept. 19–21, 1950. A discussion of the operational requirements which airborne radar must fill to be satisfactory for installation in an airline aircraft for the primary purpose of detecting and displaying dangerous weather. Several radar photographs are presented. *Subject Headings:* **Radar equipment, Radar storm detection, Aviation.**

2H–200 551.508.85

Williams, Edwin L., Jr., **The radar signal spectrograph (Rasaph). Description of the instruments and its circuit.** *Massachusetts Institute of Technology, Dept. of Meteorology, Weather Radar Research, Technical Report* No. 9, Pt. B, Jan. 1, **1950.** 24 p. 15 figs., ref. **MCM**—The purpose of this report is primarily to discuss the basic difference between the Radiation Laboratory and the Weather Radar Research version of the instrument. Complete circuit diagrams and description of each circuit are given. RASAPH measures the intensity of fluctuations of radar echoes caused by changes in reflecting targets. (*See also item* No. 2H–160.) *Subject Heading:* **Radar equipment.**

1951

2H–201 551.594.7:551.577

†*Aden, A. L., **Microwave reflection from water spheres.** *American Journal of Physics*, 19(3):163–167, March **1951.** 4 figs., 19 refs. **MH-BH**—Interesting laboratory experiments, significant for the investigation of microwave reflection from rain, are described. The 30 measurements of water in the critical electrical-size region that are presented graphically indicate good agreement between theoretical and experimental results. The equipment is explained in diagrams. *Subject Headings:* **Radar observation, Radar echoes, Microwave attenuation.**

2H–202 551.594.7:551.577

Atlas, David, **The interpretation of microwave reflections from rainfall.** Paper read before the joint meeting of the American Meteorological Society and American Geophysical Union in Washington, D. C., May 2–4, **1951.** Unpublished.—"The general behavior of the theoretical-empirical relationship between echo intensity range and rainfall attenuation is studied. . . ." A consideration of 3 cm. and 10 cm. radars suggests that the latter may be superior in some respects. *Subject Headings:* **Radar echoes, Microwave attenuation.**

2H–203 551.508.85:551.501.81

Bemis, Alan C., **A critical evaluation of radar in meteorological research.** Paper read before the joint meeting of the American Meteorological Society and American Geophysical Union in Washington, D. C., May 2–4, **1951.** Unpublished.—Advantages and limitations of radar as a meteorological tool are outlined. *Subject Headings:* **Radar equipment, Radar storm detection, Radar echoes, Definitions.**

2H–204 551.501.81:551.577.1

†*Bowen, E. G., **Radar observations of rain and their relation to mechanism of rain formation.** *Journal of Atmospheric and Terrestrial Physics*, 1(3):125–140, **1951.** 7 figs., 3 tables, 16 refs. **MH-BH**—By experimental observations of March 6, 1950, author obtained direct evidence that (1) the bright band was associated with melting of ice particles and (2) that rain was forming by the Bergeron's process. Author suggests that the "bright band" should be called "melting band," in order to distinguish it from other band structures which are discussed. The SCR 717 ground radar

operating at 9.1 cm. is advantageous in rain physics investigations. *Subject Headings:* **Bright band echoes, Ice crystals, Rain, Radar observation, Sydney, Australia.**

2H–205 551.501.81:551.594.21

Browne, Ian C., **A radar echo from lightning.** *Nature*, London, 167(4246):438, March 17, **1951.** 2 refs. **DLC**—Very brief note with a possible explanation of the phenomenon. *Subject Headings:* **Radar storm detection, Radar echoes, Lightning.**

2H–206 551.501.81:551.577.1

Cunningham, R. M., **Some observation of precipitation process within natural clouds.** Paper read before the joint meeting of the American Meteorological Society and American Geophysical Union in Washington, D. C., May 2 4, **1951.** Unpublished.—Data of 4 recent weather flights and ground radar observations were analyzed. Radar photographs were presented. *Subject Headings:* **Radar observation, Precipitation, Bright band echoes.**

2H–207 551.590.24

Eclipse observed in rain. *Science News Letter*, 59(2):21, Jan. 13, **1951.** 2 figs. **DLC**—A brief presentation on how the solar eclipse of Sept. 1950 was observed with radar at Attu, Alaska, during a gale in spite of heavy rain. *Subject Headings:* **Radar echoes, Eclipses, Alaska.**

2H–208 551.501.81:551.551

Fleisher, Aaron, **Sampling theory as applied to the measurement of turbulence by radar.** Paper read before the joint meeting of American Meteorological Society and American Geophysical Union in Washington, D. C., May 2 4, **1951.** Unpublished.—"Variations in the strength of radar echoes are related to the relative velocity of the scatters. These data can yield some information about the intensity and scale of atmospheric turbulence. . . ." *Subject Headings:* **Radar storm detection, Radar echoes, Turbulence.**

2H–209 551.501.8:551.577

Hudson, H. E., Jr., Stout, G. E. and Huff, H. A., **Radar—tomorrow's rain gage.** *Civil Engineering*, New York, 21(3):41, March **1951. DLC**—A nontechnical abstract of a paper presented before the Hydraulics Division at the ASCE Houston Convention. Radar is used by the Illinois Water Survey to detect, track and quantitatively measure rainfall in the northern part of Illinois. As the bulk of precipitation in this region occurs as local showers, radar appears to be better than rain gages. *Subject Headings:* **Radar observation, Radar echoes, Rainfall measurement.**

2H–210 551.501.81:551.577

†*Hudson, H. E., Stout, G. E. and Huff, F. A., **Studies of thunderstorm rainfall with dense raingage networks and radar.** Urbana, Illinois, State Water Survey Engineering Sub-Division, Feb. 15, **1951.** 38 leaves. 22 figs., 28 tables, 17 refs. Typewritten. **MCM**—Here are the conclusions of three years' work on concentrated raingage networks, radar rainfall extent and intensity measurements: (1) thunderstorm rainfall is multicellular, (2) application of area-depth data is more complex than is assumed, (3) orientation, duration and path of storm cells have marked effects on area-depth curves for a given basin, (4) heaviest storms were associated with cold fronts and (5) radar depicts rainfall extent better than raingaging, and measures intensity just as well as raingage networks. The paper contains valuable data of radar-meteorological interest. *Subject Headings:* **Radar observation, Radar echoes, Thunderstorm rainfall, Rainfall data.**

2H–211 551.501.8:519.2

Kaplan, S. M. and McFall, R. W., **The statistical properties of noise applied to radar range performance.** *Institute of Radio Engineers, Proceedings*, 39(1):56–60, Jan. **1951.** 6 figs., 14 equations. **DLC**—According to author, the interpretation of the radar's range performance as a statistical quantity is new and valuable. Application of this statistical method will result in: (1) more accurate comparison between existing radars and may eliminate nebulous terms (maximum effective range) and misunderstanding of false target echoes, (2) the systematic "optimization" of the radar system parameters for the required system performance. *Subject Headings:* **Radar equipment, Radar observation, False echoes.**

2H–212 551.510.535:621.396.826:523.3

†*Kerr, F. J. and Shain, C. A., **Moon echoes and transmission through the ionosphere.** *Institute of Radio Engineers, Proceedings*, 39(3):230–242, March **1951.** 12 figs., table, 29 refs., 16 equations. **DLC**—Over a year's time thirty experiments of moon echoes of about 20 mc. frequency were carried out and these conclusions were drawn: (1) echo intensities lower than expected, (2) minimum altitude

of echo higher than expected, (3) anomalous values of echo intensities and minimum detection altitude correlate with $f^{\circ}_{F_2}$, (4) slow fading was consistent with ionospheric origin, (5) fast fading was associated with the moon's libration, (6) millisecond pulses were elongated on reflection from moon, and (7) ray deviations of several degrees in a vertical plane apparently occurred. (This paper is of interest to meteorologists because of its negative aspects.) *Subject Headings:* **Radar observation, Radar echoes, Moon.**

2H–213 551.501.8:621.396.826

Lhermitte, R., **Sur une méthode d'utilisation du radar pour l'analyse des précipitations.** [On a method utilizing radar to analyze precipitation.] *Journal Scientifique de la Météorologie*, 3(9):9–15, Jan.–March **1951.** 8 figs., 3 refs. **MH-BH**—A method of vertical analysis of rain and a microphotometric technique to determine the density of rain from PPI photographs are described. Maximum echo intensity is found to appear close to the zero isotherm (always below). *Subject Headings:* **Radar observation, Rainfall intensity, Bright band echoes.**

2H–214 551.508.85:771(06)

Ligda, Myron, G. H., **Special radar scope cameras.** *Massachusetts Institute of Technology, Dept. of Meteorology, Weather Radar Research, Technical Report* No. 11, Feb. 1, **1951.** 41 p. 17 figs., 9 refs. **MCM**—A report on various types of radar scope cameras that have been constructed since Report No. 4 was written. *Subject Heading:* **Radar equipment.**

2H–215 551.501.81:551.578.4

Marshall, J. S., **Intensity of radar echoes from snow.** Paper read before the joint meeting of the American Meteorological Society and American Geophysical Union in Washington, D. C., May 2–4, **1951.** Unpublished.—Suggests a method of determining by radar whether rain or snow will fall. *Subject Headings:* **Radar echoes, Snow, Rain, Radar observation.**

2H–216 551.501.8:621.396

Moulton, P., **Unusual radar echo. Caribbean Sea.** *Marine Observer*, 21(152):76–77, April **1951. MH-BH**—The ship passed close to west of a very dark cloud with the radar operating at 30,000 yds. scan. No observable echo. Few minutes later a sharp intensive PPI signal appeared with a curving trail 2–3,000 yds. behind, quickly fading out. No barograph or temperature change. No sign of waterspouts. *Subject Headings:* **Radar echoes, Clouds.**—*C.E.P.B.*

2H–217 551.501.81:551.577

Radar tells where rain falls in big area. *Science News Letter*, 59(17):268, April 28, **1951. MH-BH**—Popular article on how radar measures amount of rain, the location of precipitation and the directional movement of rainstorms within a 7,800 sq. miles area in Illinois. *Subject Headings:* **Radar storm detection, Radar echoes, Precipitation.**

2H–218 551.501.81:551.509.1(02).

RAREPS. *U. S. Air Weather Service, Manual* 105–28, Feb. **1951.** 10 p. 7 tables. **DWB**—The most recent manual of instructions for reporting by code the data obtained from radar observations of storms and movements of any echo patterns. *Subject Headings:* **Radar observation, Synoptic codes, Manuals.**—*M.R.*

2H–219 551.5:656.6:621.396.9:629.12

Saxton, J. A. and Jopkins, H. G., **Some adverse influences of meteorological factors on marine navigational radar.** *Institution of Electrical Engineers, Proceedings*, 98(3):26–36, **1951.** 8 figs., 15 refs. **DBS**—Absorption of 3.2 cm. radar in the atmosphere (insignificant) and absorption and scattering by various forms of precipitation are discussed. With large targets the attenuation by rain is the most important factor, with smaller targets, masking by echoes from the precipitation. Snow is very rarely sufficiently heavy to give important echoes. In dense fog (visibility below 25 m.) attenuation is significant. *Subject Headings:* **Radar propagation, Radar echoes, Precipitation, Marine navigation.**—*C.E.P.B.*

2H–220 551.501.8:551.577

Stout, G. E., Huff, F. A. and Farnsworth, G. W., **Quantitative measurements of rainfall by radar.** Paper read before the joint meeting of the American Meteorological Society and American Geophysical Union in Washington, D. C., May 2–4, **1951.** Unpublished.—Except for rainfall rates of 0.4 in. and up, the preliminary data with a 3 cm. radar through 1950 agree fairly well with the general radar theory. *Subject Headings:* **Radar observation, Radar echoes, Rainfall measurement.**

2H–221 551.501.81:551.577.3

Swingle, D. M., **Radar observations of periodic fluctuations in the intensity of "continuous" precipitation.** Paper read before the joint meeting of the American Meteorological Society and American Geophysical Union in Washington, D. C., May 2–4, **1951.** Unpublished.—Twenty months' observations, with a 10 cm. radar, illustrated by excellent 35 mm. film radar photographs, indicate that "continuous" precipitation is characterized by fluctuations (period from one half to five minutes) rather than by uniformity in time. *Subject Headings:* **Radar storm detection, Radar echoes, Precipitation variations.**

2H–222 551.501.8:621.396

Bemis, Alan C., **Reflection characteristics of weather clutter.** Massachusetts Institute of Technology, Dept. of Meteorology, Weather Radar Project, [n.d.]. 17 p. 13 figs., 3 plates, 16 refs. **MCM**—"This paper deals with the nature of weather clutter, its beneficial and detrimental aspect and means of minimizing its effects." *Subject Headings:* **Radar echoes, Microwave propagation.**

2H–223 551.501.81

†*Ligda, Myron G. H., **Radar storm observation.** Massachusetts Institute of Technology, [n.d.] 18 p. 16 figs., table, 71 refs., 6 equations. Unpublished.—Opens with a discussion of the theory of radar storm detection and its observational verification. The author deals next with weather phenomena as observed on radar scopes, and analyzes the radar storm echo signal. The last part of the paper is devoted to the future of radar in storm detection and physical meteorology. Radar reveals that precipitation formations of significance "occur on a scale too gross to be observed from a singlet station, yet too small to appear even on sectional synoptic charts." Phenomena of this size might well be designated as "mesometeorological." *Subject Headings:* **Radar echoes, Radar storm detection.**

2H–224 551.501.81

Ligda, Myron G. H., **New England storms as seen by radar.** Massachusetts Institute of Technology, Dept. of Meteorology, Weather Radar Research, [n.d.] Unchecked.—A moving picture. *Subject Heading:* **Radar storm detection.**

SUPPLEMENTARY MATERIAL

(*Came to our attention too late for inclusion in proper order*)

2H–225 551.508.57:621.396.826

Kastrov, V. V., **Radiozond bez peredatchika.** [A radiosonde without a transmitter]. *Meteorologiia i Gidrologiia, Informatsionnyĭ Sbornik*, No. 3:83–86, **1946.** 3 figs. **DLC**—Author presents operational methods and schematic diagrams of a radarsonde. Experimental results show that the clearest signals are received from approximately one to ten kilometers. *Subject Headings:* **Radar equipment, Radarsondes.**

2H–226 551.501.8:629.13

Battison, John H., **Applications of radar to aeronautical operations.** *Tele-tech*, New York, 10(5):50–51, May **1951.** 3 figs. **DWB**—Pilots in flight can receive advance warning of obstacles, heavy storm clouds and other planes while flying through bad weather areas. A brief nontechnical article. *Subject Headings:* **Radar storm detection, Navigational aids, Aeronautical meteorology.**—*M.R.*

2H–227 551.508.85:551.501.81

Bemis, Alan C. and Williams, Edwin L., **A radar installation for weather radar research.** *Massachusetts Institute of Technology, Dept. of Meteorology, Technical Report* No. 15, June **1951.** 13 p. 6 figs., 7 refs. **DWB**—Unchecked. *Subject Headings:* **Radar storm detection, Radar equipment.**

2H–228 551.578:621.396

Forsgren, S. K. H. and Perers, O. F., **Vertical recording of rain by radar.** *Chalmers Tekniska Högskola, Handlingar*, No. 107, **1951.** 19 p. In English. **DLC**—Unchecked. *Subject Headings:* **Rainfall, Radar observation.**

2H–229 551.501.81:551.55

Jorgensen, R. C. and Gerdes, W. F., **The Dow Chemical Company leads industry in using radar for hurricane detection.** *American Meteorological Society, Bulletin*, 32(6):221–224, June **1951.** 3 figs. **MH–BH**—Costly shutdowns of the plant are reduced to a minimum by using radar (since

1946) to track hurricanes in the Gulf of Mexico. Three radar stations operated by the U. S. Weather Bureau, three operated by industrial concerns and two by educational institutions are operating on the Gulf Coast to obtain more detailed, continuous information on hurricanes. *Subject Headings:* **Radar storm detection, Hurricanes, Winds.**

2H–230 551.578.1:551.501.81

Obsorne, F. L., **Rain squalls on radar P.P.I.** *Marine Observer*, 21(151):9–10, Jan. **1951.** 4 figs. **DWB**—Sketches show 5 showers in North Atlantic within 12 miles, converging on ship with a squall of hurricane force. Ship was near point of occlusion of a depression near Cape Cod. *Subject Headings:* **Rain squalls, Radar storm detection.**—*C.E.P.B.*

2H–231 551.510.53:551.524.7:551.557.3

Scrase, F. J., **Radiosonde and radar wind measurements in the stratosphere over the British Isles.** *Royal Meteorological Society, Quarterly Journal*, 77(333):483–488, July **1951.** 4 figs., table, 8 refs. **MH-BH**—Mean temperatures and winds up to 100,000 ft. in winter and summer, derived from radiosonde ascents, are described. The changes from winter lapse to summer inversion and from the winter W to summer E "monsoon" are illustrated, also the annual variation of temperature showing a marked increase at 100,000 ft. *Subject Headings:* **Stratosphere, Upper air temperatures, Upper air wind variations, Radar observation.**—*C.E.P.B.*

2H–232 551.508.85:551.577

Stout, Gleason Emmanuel and Huff, F. A., **Radar tracks rainstorms for radio.** *Weatherwise*, 4(2):40–41, April **1951.** fig. **MH–BH**—A description of the use of radar for quantitative measurements of precipitation and a description of the operation and organization of a radar rainfall service provided by the Water Survey of the Illinois Dept. of Registration and Education to a radio station. *Subject Headings:* **Radar observation, Precipitation measurement, Weather broadcasts.**—*I.L.D.*

PART III. METEOROLOGICAL ARTICLES APPEARING IN RECENTLY ISSUED PUBLICATIONS

Note: The contents of periodicals included in this section are for information only, and will not be listed in the monthly indexes. When material is furnished in advance of date of publication, the pagination may be omitted.

American Geophysical Union, Transactions, Volume 32, Number 3, June 1951.

Kassander, A. R., Jr. and Stebbins, D. W.: **The application of electrical counting to the compilation of frequency distributions and correlation tables,** p. 341–346.

Leopold, Luna B.: **Rainfall frequency: an aspect of climatic variation,** p. 347–357.

White, Robert M.: **On the energy balance of the atmosphere,** p. 391–396.

Zietz, Isidore and Henderson, Roland G.: **Magnetic anomalies at high altitudes,** p. 397–404.

Shepard, Francis P.: **Mass movements in submarine canyon heads,** p. 405–418.

Arons, Arnold B. and Stommel, Henry: **A mixing-length theory of tidal flushing,** p. 419–421.

Youker, R. E. and Dreibelbis, F. R.: **An improved soil-moisture measuring unit for hydrologic studies,** p. 447–449.

Peltier, Louis C.: **Discussion of "Erosion pavement, its formation and significance" by W. C. Lowdermilk and H. L. Sundling,** p. 466–467.

Powell, Ralph W.: **Discussion of "Fluid resistance of composite roughness" by H. A. Einstein and R. B. Banks,** p. 467–469. Reply by authors, p. 469.

Letter to the Editor

Schmidt, Milton O.: **Hydrology comes of age,** p. 470–472.

Annalen der Meteorologie, Medizin-meteorologische Hefte, Number 5, 1951.

Berg, H.: **Kosmische Einflüsse auf den Organismus,** [Cosmic influences on the organism], p. 1–17.

Mörikofer, W.: **Zur Problematik der Wetterfühligkeit,** [On the problem of weather sensitiveness], p. 18–20.

Courvoisier, P.: **Die Bedeutung von Schwankungen des Luftdruckes und des elektrischen Feldes für die Erklärung der Wetterfühligkeit,** [The importance of variations of atmospheric pressure and of the electrical field for the explanation of weather sensitiveness], p. 20–22.

Cyran, W.: **Die Grenzen der Leistungsfähigkeit der n-Methode,** [The limits of applicability of the n-method], p. 24.

Sarre, Hans: **Solare Einflüsse auf die Takata-Reaktion,** [Solar influences on the Takata reaction], p. 25–28.

Menzel, W.: **Endogene Änderungen der Tagesrhytmik bei Gesunden und Kranken,** [Endogenous changes of the daily rhythm in healthy and sick persons], p. 28–37.

Curry, M.: **Klimaunterschiede und wetterbedingte Reaktionstypen,** [Climatic differences and reaction types due to weather], p. 29–53.

Ungeheuer, H.: **Die Beziehungen des bodennahen Ozons (Aran) zu den Wetterfaktoren,** [The relations of ozone near the ground (Aran) to weather factors], p. 53–58.

Specht, W. und Rühlicke, K.: **Bioklimatische Einflüsse (Aran) auf das Differentialblutbild gesunder und ultraschallbehandelter Individuen,** [Bioclimatic influences on the differential blood picture of healthy individuals and those treated with high frequency sound waves], p. 58–66.

Hoehne, K.: **Konstitutions- und Reaktionstypen in der Bioklimatik,** [Constitution and reaction types in bioclimatology], p. 66–71.

Lossnitzer, H.: **Einführung zur Generalaussprache, (1. Tagung der Freiburger Arbeitsgemeinschaft für bioklimatische Forschung vom 24–26 März 1950),** [Introduction to the general discussion, (First meeting of the Freiburger working party for bioclimatic investigation, 24–26 March, 1950)], p. 73–76.

Bohnenkamp, H.: **Die Bedeutung des Mikroklimas für die Betrachtung der Wettereinflüsse auf den Menschen,** [The importance of microclimate for the consideration of the influence of weather on men], p. 76–77.

Menzel, Willi: **Terrestrische Wirkungen der Sonnenstrahlung,** [Terrestrial effect of solar radiation], p. 77–80.

Mügge, R.: **Das Wesen der Wetterfronten,** [The mechanism of weather fronts], p. 80–88.
Cyran, W.: **Die bioklimatische Reizwirkung erdmagnetischer Störungen,** [The bioclimatic stimulus of terrestrial magnetic disturbances], p. 89.

Annales de Géophysique, Volume 6, Number 3, July–September 1950.

Goguel, Jean: **Les déplacements séculaires du pôle,** [Secular displacements of the pole], p. 139–146.
Bernard, Pierre: **Enregistrements microséismiques à Nantes,** [Microseismic recording at Nantes], p. 147–156.
Vegard, L.: **Nouveaux résultats importants dans l'étude du spectre des aurores boréales et la physique de l'ionosphère,** [New important results in the study of the spectrum of the aurora borealis and physics of the ionosphere], p. 157–163.
Harff, V.: **Comparabilité des mesures actinométriques,** [Comparability of the actinometric measurements], p. 179–190.
Robley, R.: **La diffusion multiple dans l'atmosphère déduite des observations crépusculaires,** [Multiple diffusion in the atmosphere calculated from the twilight observations], p. 157–163.
Gallet, R. and Rawer, K.: **Ionisation de la couche F2 et l'activité solaire sur l'ensemble du globe (Tables numériques),** [Ionization of the F2 layer and the solar activity over the entire globe (Numerical tables)], p. 212–213.
Delayque, A.: **Remarques sur les ions qui peuvent être à l'origine des moments magnétiques de sphères matérielles tournant autour d'un de leurs diamètres, électriquement neutres dans leur ensemble, et qui ne contiennent qu'une espèce d'ions de chaque signe. Application aux astres,** [Remarks on ions which can be the origin of magnetic moments of material spheres which rotate about one of their diameters which are electrically neutral as a whole and which possess only one species of ions of each sign. Application to stars], p. 214–216.
Ferrand, P., Morellet, D. and Bousser, F.: **Technique de ballonsonde groupés pour l'étude du rayonnement cosmique en haute atmosphère,** [Balloon sounding technique grouped for the study of cosmic radiation in the upper atmosphere], p. 217–224.

Annales de Géophysique, Volume 6, Number 4, October–December 1950.

Van Mieghem, Jacques: **Les bilans de la quantité de mouvement et de l'énergie mécanique dans l'atmosphère,** [Balance of the quantity of movement and mechanical energy in the atmosphere], p. 227–237.
Pontier, L.: **Amplitude de la variation diurne de H au voisinage de l'équateur magnétique au Togo,** [Amplitude of the diurnal variation of H in the vicinity of the magnetic equator in Togo], p. 238–241.
Argence, E., Mayot, M. and Rawer, K.: **Contribution à l'étude de la distribution électronique de l'ionosphère et de l'absorption des ondes courtes,** [Contribution to the study of electrical distribution in the ionosphere and absorbtion of short waves], p. 242–285.
Bricard, J. and Kastler, A.: **Polarisation des radiations monochromatiques du ciel nocturne et de la raie D crépusculaire,** [Polarization of the monochromatic radiation of the night sky and of the D crepuscular ray], p. 286–299.
Rougerie, Paul: **Variation diurne lunaire de la déclinaison magnétique et de la composante verticale du champ terrestre au Val-Joyeux,** [Diurnal lunar variation of the magnetic declination and of the vertical component of the earth's field at Val-Joyeux], p. 300–308.
Barré, M. and Rawer, K.: **Une perturbation ionosphérique extraordinaire observée en terre Adélie,** [An unusual magnetic disturbance observed in Adélie Land], p. 309–317.
Nicolet, M.: **Propositions pour une nomenclature de la haute atmosphère,** [Proposals for a nomenclature of the upper atmosphere], p. 318–321.
Boutet, R.: **Sondage optique de l'atmosphère par mesure de la scintillation,** [Optical sounding of the atmosphere by means of scintillation], p. 322–330.
Dessens, J.: **Recherches sur la pluie artificielle à l'observatoire du Puy de Dôme,** [Research on artificial rain at the observatory of Puy de Dôme], p. 331–344.

Annales de Géophysique, Volume 7, Number 1, Jan.–March 1951.

Dufay, Jean: **Bandes d'émission des molécules OH et O_2 dans le spectre du ciel nocturne, entre 9000 et 1000 Å,** [Emission bands of OH and O_2 molecules in the spectra of the night sky between 9000 and 11000 Å], p. 1–8.
Allard, Pierre: **Forme et énergie de l'onde-marée de vive eau entre les Héaux de Bréhat et le Cap de la Hague,** [Form and energy of the tidal wave of spring water between Heaux de Bréhat and the Cape La Hague], p. 9–44.

Tcheng, Mao-lin: **Mesures de la quantité d'ozone contenue dans l'atmosphère par spectrophotométrie photographique du ciel blue au zénith,** [Measurement of the quantity of ozone contained in the atmosphere by means of photographical spectrometry of the blue sky in the zenith], p. 45–58.

Baussan, J.: **La composante de Chandler dans la variation des niveaux marins,** [The Chandler component in the variation of sea levels], p. 59–62.

Israël, Hans and Kasemir, H. W.: **Ueber die Schirmwirkung von Gebäuden auf die Schwankungen des atmosphärisch-elektrischen Feldes,** [The shelter effect of buildings on oscillations of the atmospheric-electric field], p. 63–68.

Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A, Volume 3, Number 3–4, 1951.

Raethjen, P.: **Über den zweidimensionalen Impulsaustausch, rotierender Systeme,** [Two-dimensional exchange of impulse of rotating systems], p. 173–228.

Nagel, H.: **Zur Stabilitäts-Theorie des geostrophischen Windes,** [Stability theory of the geostrophic wind], p. 229–267.

Defant, F.: **Kondensationswärme und Strahlungsbilanz in einem mittleren Meridionalschnitt der Troposphäre,** [Heat of condensation and radiation balance in an average meridional section of the troposphere], p. 268–289.

Wichmann, H.: **Die Weltgewittertätigkeit und das luftelektrische Feld der Erde,** [World thunderstorm activity and the atmospheric electric field of the earth], p. 290–302.

Flohn, H.: **Solare Vorgänge im Wettergeschehen,** [Solar processes in weather phenomena], p. 303–329.

Huber, A.: **Über den Einfluss der Bodenfeuchtigkeit auf geoelektrische Tiefenmessungen,** [On the influence of soil moisture on geoelectric depth measurements], p. 330–338.

Steinhauser, F.: **Reinhold Süring,** p. 339–340.

Archiv für Meteorologie, Geophysik und Bioklimatologie, Serie A, Volume 3, Number 5, 1951.

Israël, H., Kasemir, H. W. and Wienert, K.: **Luftelektrische Tagesgänge und Massenaustausch im Hochgebirge der Alpen. Die luftelektrischen Verhältnisse am Jungfraujoch (3472 m.),** [Diurnal variations of air electricity and air mass exchange in the high Alps. Air electric conditions at the Jungfraujoch (3472 m.)], p. 357–381.

Kumm, A.: **Ueber die Entstehung von elektrischen Ladungen bei Vorgängen in der kristallinen Eisphase,** [On the origin of electric charge during the crystalline ice phase], p. 382–401.

Bider, M. and Thams, J. C.: **Ueber die Gewitterwahrscheinlichkeit als Funktion des Dampfdruckes,** [On the probability of thunderstorms as a function of vapor pressure], p. 402–407.

Gassmann, F.: **Ueber mechanische Empfänger von Seismographen und Schwingungsmessern,** [Automatic receivers of seismographs and oscillation meters], p. 408–422.

Untersteiner, N.: **Seiches und Schelfschwingungen, untersucht an einem Alpensee,** [Seiches and shore oscillations, investigated at an Alpine lake], p. 423–452.

Dessauer, F., Grafunder, W. und Schafhauser, J.: **Ueber atmosphärische Pulsationen,** [Atmospheric pulsations], p. 453–463.

Huber, A.: **Geoelektrische Tiefenmessungen in Tälern,** [Geoelectric depth measurements in valleys], p. 464–469.

Godske, C. L.: **Vilhelm Bjerknes,** p. 480–471.

Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B, Volume 2, Number 4, 1951.

Dirmhirn, Inge: **Untersuchungen der Himmelsstrahlung in den Ostalpen mit besonderer Berücksichtigung ihrer Höhenabhängigkeit,** [Investigations on sky radiation in the eastern Alps with special consideration for altitude], p. 301–346.

Sauberer, F.: **Registrierungen der nächtlichen Ausstrahlung,** [Record of outgoing radiation at night], p. 347–359.

Uttinger, H.: **Zur Höhenabhängigkeit der Niederschlagsmenge in den Alpen,** [Relationship between altitude and amount of precipitation in the Alps], p. 360–396.

Archiv für Meteorologie, Geophysik und Bioklimatologie, Serie B, Volume 2, Number 5, 1951.

Mörikofer, W. und Schüepp, W.: **Aktinometrische Untersuchungen während des internationalen Polarjahrs 1932/33 auf dem Jungfraujoch (3471 m.),** [Actinometric investigations during the international polar year 1932/33 on the Jungfraujoch (3471 m.)], p. 397–426.

Lauscher, F.: **Ueber die Verteilung der Windgeschwindigkeit auf der Erde,** [On the distribution of the wind velocity on the earth], p. 427–440.

Diem, M.: **Tagesgang der relativen Feuchtigkeit in der bodennahen Luftschicht im Grass und über nacktem Humus,** [Daily variation of relative humidity of the surface air layer in grass and over bare humus], p. 441–447.

Held, A.: **Beitrag zu einer Definition für Starkregen im Ostalpengebiet,** [Contribution to a definition of heavy rain in the eastern Alps region], p. 448–461.
Pollak, L. W.: **Conversion of hollerith punched card machines for use of un-punched cards,** p. 462–467.
van der Bijl, W.: **Methodical considerations on the statistical operations concerning climatic variations,** p. 468–485.
Takata, M.: **Ueber eine neue biologisch wirksame Komponente der Sonnenstrahlung,** [On a new biologically effective component of solar radiation], p. 486–508.

Australian Journal of Scientific Research, Series A, Physical Sciences, Volume 3, Number 4, December 1950.

Wild, J. P.: **Observations of the spectrum of high-intensity solar radiation at metre wavelengths. III. Isolated bursts,** p. 541–557.

Australian Journal of Scientific Research, Series A, Physical Sciences, Volume 4, Number 1, March 1951.

Radok, J. R. M.: **Solution of a heat flow problem,** p. 12–15.
Caro, D. E., Parry, J. K. and Rathgeber, H. D.: **The momentum spectrum and positive excess of cosmic ray mesons at sea-level,** p. 16–35.
Wild, J. P.: **Observations of the spectrum of high-intensity solar radiation at metre wavelengths. IV. Enchanced radiation,** p. 36–50.
Christiansen, W. N., Hindman, J. V., Little, A. G., Payne-Scott, Ruby, Yabsley, D. E. and Allen, C. W.: **Radio observations of two large solar disturbances,** p. 51–62.

Hemel en Dampkring, Volume 49, Number 5, 1951.

van de Hulst, H. C.: **Radiosterrewacht Sydney,** [Sydney Radio Observatory], p. 81–90.
ten Kate, H.: **Luchtspiegelingen,** [Mirages], p. 91–94.
van der Ham, C. J. and Kuipers, W. J. A.: **Karakteristieke weertypen V. De noordwestlijke circulatie,** [Characteristic weather types V. The northwesterly circulation], p. 97–98.

Hemel en Dampkring, Volume 49, Number 6, 1951.

ten Kate, H.: **Stormen en microseismen,** [Storms and microseisms], p. 101–106.
van der Ham, C. J.: **Interessante resultaten van enkele kinderballonwedstrijden,** [Interesting results of some toy balloon flights], p. 112–113.

Hemel en Dampkring, Volume 49, Numbers 7/8, 1951.

Delver, A.: **De windhozen van 23 Augustus 1950,** [The tornado on the 23rd of Aug. 1950], p. 121–129.
Raimond, J. J., Jr.: **Radostraling ontvangen van waterstofatomen in de interstellaire ruimte,** [Radio waves received from hydrogen atoms in interstellar space], p. 131–135.

Indian Journal of Meteorology and Geophysics, Volume 2, Number 2, April 1951.

Vagaries of the Southwest monsoon 1950, p. 96–100.
Koteswaram, P.: **Physical properties of the upper atmosphere over India,** p. 101–112.
Desai, B. N.: **Some aspects of tropical meteorology with special reference to the Indian weather —An examination of Malurkar's concepts regarding them,** p. 113–120.
Rao, Y. P. and Chelam, E. V.: **Vertical velocity and rainfall by convergence due to latitude effect,** p. 121–126.
Mooley, D. A.: **Normal density distribution in the atmosphere,** p. 127–137.
Pramanik, S. K. and Hariharan, P. S.: **Maximum dew-point temperatures in India,** p. 138–141.
Gadre, K. M.: **Micro-climatic survey of a sugarcane field,** p. 142–150.

Journal of Atmospheric and Terrestrial Physics, Volume 1, Number 4, 1951.

Elliot, H. and Dolbear, D. W. N.: **Directional measurements of the diurnal variation of cosmic ray intensity,** p. 205–214.
Dolbear, D. W. N. and Elliot, H.: **Seasonal and diurnal variations in cosmic ray intensity,** p. 215–222.
McIntosh, D. H.: **Geomagnetic "sudden commencements" at Lerwick,** p. 223–232.
Whale, H. A.: **Fine structure of the ionospheric region E,** p. 233–243.
Whale, H. A.: **Determination of electron densities in the ionosphere from experimental (h′, f) curves,** p. 244–253.

Chapman, Sydney: **"Oscillations of the earth's atmosphere"** by Wilkers, M. V., p. 254.
Indices of geomagnetic activity of the observatories Abinger (Ab), Eskdalemuir (Es), Lerwick (Le) January to December 1950, p. 254–260.

Journal of Meteorological Research, Tokyo, Volume 2, Number 12, December 1950.

Sugiura, L.: **On the water temperature and salinity in the Antarctic Ocean,** p. 357–362.
Isozaki, I.: **On the pressure and temperature variations in the upper troposphere,** p. 363–373.
Daidoji, S. and Suzuki, T.: **An investigation on flood forecast in snow melting period in Hokuriku District,** p. 374–379.
Ite, R. and Suzuki, E.: **A statistical study on winter air temperature in Tokyo (1st report),** p. 380–382.
Miyake, T.: **Wind direction at Naze,** p. 383–390.
Yamanaka, K.: **On the water content of soil at Owada in Kanto District,** p. 391–395.

Journal of Meteorological Research, Tokyo, Volume 2, Number 13, February 1951.

Saito, H.: **On the indoor climate,** p. 397–425.

Journal of Meteorological Research, Tokyo, Volume 3, Number 2, January 1951.

Ohta, S.: **Vapour pressure of a small solution particle (Studies on condensation nuclei, V),** p. 45–50.
Kadowaki, T.: **On the wind "Yamase,"** p. 51–62.
Saito, N.: **Two cyclones with abnormal path,** p. 63–69.
Daigo, Y. and Suzuki, Y.: **On the climatic divisions concerning with the weather damages in Japan,** p. 70–77.

Journal of Meteorological Research, Tokyo, Volume 3, Number 3, February 1951.

Daigo, Y. and Suzuki, Y.: **Climatic division concerning with the yield of Aquatic rice, wheat, common barley and naked barley,** p. 79–98.
Daigo, Y. and Maruyama, E.: **On the distribution of air temperature in Oze-plain (1st report),** p. 99–105.
Daigo, Y. and Maruyama, E.: **Air temperature in observation field and in wheat field,** p. 106–108.

Meteorological Magazine, London, Volume 80, Number 948, June 1951.

Bilham, E. G.: **First Congress of the World Meteorological Organization,** p. 153.
Forsdyke, A. G.: **Zonal and other indices,** p. 156.
Lacy, R. E.: **Variations of the winter means of temperature, wind speed and sunshine, and their effect on the heating requirements of a house,** p. 161.
Marshall, W. A. L.: **Festival of Britain, 1951,** p. 165.
Meteorological Office Discussion, p. 169.
Meteorological Research Committee, p. 173.

Meteorological Society of Japan, Journal, 2nd Series, Volume 29, Number 5, May 1951.

Kobayashi, A.: **On the transmissibility of light through a cloud particle (For the wavelengths from 4320 Å to 9500 Å),** p. 139–146.
Unoki, Sanae: **On the upheaving effect of the stationary and non-stationary winds upon the sea level, (An investigation on meteorological tides in the neighbouring seas of Japan—2nd Paper),** p. 147–162.
Murakami, T.: **On the study of the change of the upper westerlies in the last stage of Baiu Season (Rainy season in Japan),** p. 162–175.
Arakawa, H.: **Equations of motion in the system of natural coordinates,** p. 176–179.

Meteorologické Zprávy, Prague, Volume 4, Number 1–2, 1950.

Konček, Mikulás: **Silné dažde a búrky na východnej Morave a na Slovensku v noci na 20. a na 22. septembra 1949,** [The torrential rains and thunderstorms in eastern Moravia and Slovakia during the nights of September 20 and 22, 1949], p. 4–6.
Brandejs, Stanislav: **Theorém vírnatosti,** [Theory of tornado formation], p. 7–8.
Hambálek, Josef: **Vliv föhnu na kvality podnebí horní Čeladné,** [The influence of the föhn on the character of the climate of upper Celadna], p. 9–14.
Förchtgott, Jiří: **Transport drobných částic nebo hmyzu přes Krušné hory,** [Transport of microparticles of insects over Krušné hory (mountains)], p. 14–16.

Petrovič, Št.: **Výskum srážkových pomerov totalizátormi na hrebeňoch slovenských hôr,** [Research on precipitations with totalizers on the ridges of Slovak mountains], p. 16–19.
Červený, Jaroslav: **Námraza na letadlech,** [Icing on airplanes], p. 19–21.
Stružka, Vl.: **Ubývání teploty s nadmořskou výškou u nás,** [Temperature decrease with altitude above sea level in our country], p. 21–22.
Karský, Vladimír: **Dlouhodobé průměry teplot vzduchu,** [Averages of atmospheric temperature over long periods], p. 23.
Žemlová-Boušková, Věra: **Dlouhodobé průměry teplot půdy,** [Averages of soil temperature over long periods], p. 24–34.
Brablec, Josef: **Předpověď nočních mrazů podle sinjavskeho,** [Forecasts of nocturnal frosts according to Sinjavsky], p. 35–36.
Gregor, Alois: **Dlouhodobé předpovědi počasi,** [Long-range weather forecasts], p. 36–37.
Brádka, Jan: **Pětidenní předpovědi počasí vydávané Americkou povětrnostní službou,** [Five-day forecasts published by the American Meteorological Service], p. 37–41.
Látal, Arnošt and Látalová, Blanka: **Grafické znázornění osluněni ploch,** [Graphic representation of insolation of surfaces], p. 42–46.
Veselý, Emil: **Bodování počasí podle Gregora a korelace s aktinometrem Arago-Davyho,** [Weather classification according to Gregor and correlation with the Arago-Davy actinometer], p. 46–47.
Uhlíř, Pavel: **Thermistory pro mikrometeorologická měření,** [Thermistors for micrometeorological measurements], p. 48–50.

Meteorologické Zprávy, Prague, Volume 4, Number 3–4, 1950.

Brablec, Josef: **Pokus o znázornění nebezpečí mrazů v době vegetační,** [An attempt to demonstrate the danger of frost during the growing season], p. 57–60.
Petrovič, Štefan: **O najteplejšie miesto na Slovensku,** [The warmest place in Slovakia], p. 61–62.
Brandejs, Stanislav: **Některé pomůcky aerologické praxe,** [Some aids for aerological practice], p. 62–65.
Hlaváč, Václav: **Nový způsob současného grafického znázorňování časového průběhu odchylek teploty a srážek,** [A new method for simultaneous graphic presentation of variations in temperature and precipitation], p. 65–69.
Pícha, Jan: **Třicet let Státního ústavu geofysikálního,** [Thirty years of the State Geophysical Institute], p. 69–70.
Krečmer, Vladimír: **Ovlivňují lesy vodní poměry?** [Do forests influence water conditions?], p. 71.
Förchtgott, Jiří: **Obtékání kuželového vrcholu vzdušným proudem,** [The flow of air around a conical summit], p. 72–74.
Křivský, Lad.: **Chromosférické erupce a denní atmosférické srážky v Praze v letech 1947 a 1948,** [Chromospheric eruptions and daily atmospheric precipitation in Praha in 1947 and 1948], p. 75.
Bouška, Jiří: **Kolísání oblačnosti v Evropě a sluneční činnost,** [Variations of cloud cover in Europe and solar activity], p. 76.
Spirhanzl, Jaroslav: **Okolo hromů, blesků a bouří,** [Thunder, lightning and storms], p. 77–78.
Starý, Jaroslav: **Polarografické stanovení chloridů v dešťové vodě,** [Polarographic determination of chlorides in rain water], p. 78–80.
Fikar, Jan: **Větrná smršť dne 20. dubna 1950,** [The tornado of April 20, 1950], p. 80–82.
Kejla, Jaroslav: **Trend v meteorologii,** [Trends in meteorology], p. 83–85.
Trefná, E.: **Význam místního podnebí při plánování klimatických míst,** [The importance of local climate in the planning of health resorts], p. 86–87.
Pejml, Karel: **Dlouhodobé prognosy,** [Long-range forecasts], p. 87–89.
Molnár, Ladislav: **Príspevok k ustáleniu prítokového súčiniteľa, pre projektovanie zavodňovacích zariadení v oblast Nové Zámky—Šala,** [Contribution to the stabilization of a tributary coefficient in the irrigation project of the Nové Zámky—Sala area], p. 89–90.
Uhlíř, Pavel: **Samočinné zařízení na ochranu proti jarním mrazům,** [Automatic device for protection against spring frosts], p. 90–92.
Teuchner, Zdeněk: **Montáž anemografu,** [Installing an anemograph], p. 92–93.
Kozumplík, Stanislav: **Universální anemograf a anemometrické dvojče,** [The universal anemograph and the tele-anemometer], p. 93–98.

Meteorologische Rundschau, Volume 4, Numbers 3–4, March–April 1951.

Schwerdtfeger, Werner: **Das thermische Tief im nordwestern Argentiniens,** [The thermal low in N.W. Argentina], p. 49–52.

Hinkelmann, Karl: **Horizontale Massendivergenz als Funktion des Luftdruckfeldes,** [Horizontal mass divergence as a function of the air pressure field], p. 53–55.
Nagel, F.: **Fehler in der Luftdruckmessung mit Radiosonden und ein Temperaturkompensiertes Druckmessgerät,** [Error in pressure measurement with radio sondes and a pressure-unit compensated for temperature], p. 55–59.
Holzapfel, Rupert: **Zum Mechanismus des täglichen Temperaturganges in den Stockwerken der Troposphäre,** [On the mechanism of the diurnal variation of temperature in the layers of the troposphere], p. 59–62.
Grunow, Johannes: **Der Wetterdienst bei der internationalen Skiflugwoche vom 28.2.–6.3.1950 in Oberstdorf,** [The weather service in the international ski-jumping week from 28.2–6.3.1950 in Oberstdorf], p. 62–64.
Ehmert, Alfred: **Ein einfaches Verfahren zur absoluten Messung des Ozongehaltes von Luft,** [A simple method for the absolute measurement of the ozone content of air], p. 64–68.
Faust, Heinrich: **Böenstärke und Temperaturfall bei Wärmegewittern,** [Squall strength and temperature fall in heat thunderstorms], p. 68–70.
Steinhäusser, Hans: **Über die Abkühlungsgrösse in bewegtem Wasser,** [On the cooling power in moving water], p. 70–71.

Oceanographic Magazine, Tokyo, Volume 2, Number 3, September 1950.

Ichiye, Takashi: **On the theory of Tsunami,** p. 83–100.
Ichiye, Takashi: **Some remarks on Richardson's neighbour diffusion equation,** p. 101–104.
Ichiye, Takashi: **On the effect of lateral mixing in the ocean current,** p. 105–111.
Miyazaki, M.: **On the theory of lateral mixing in the sea,** p. 113–115.
Miyazaki, M.: **Lateral mixing effect on the distribution of ocean currents,** p. 117–121.
Hishida, Kozo: **On the coastal water and its relation to the oceanic water,** p. 123–128.

Oceanographic Magazine, Tokyo, Volume 2, Number 4, December 1950.

Takenouti, Yositada: **On the transparency of sea water,** p. 129–135.
Masuzawa, J.: **On the intermediate water in the southern sea of Japan,** p. 137–144.
Ichiye, Takashi: **One type of non-dispersive planetary wave,** p. 145–148.
Kawamura, Shiro, Tsubata, Fumitaka, Taguchi, Ryuzo, Kitamura, Hiroyuki and Sugiura, Jiro: **Report on sea and weather observation on Antarctic whaling ground,** p. 149–180.

Revista Meteorológica, Montevideo, Volume 9, Number 34, July 1950.

Serra, Adalberto: **Monografia sobre mecanismo del "Tempo" en el Brasil,** [Monograph on the mechanism of the "weather" in Brazil], p. 87–106.
Boffi, Jorge Alberto: **Los efectos de los Andes en la circulación aérea sobre la parte austral de Sur América,** [The effect of the Andes on the atmospheric circulation of the southern part of South America], p. 107–112.
Bergeiro, Jose Maria: **Regimentación ecológica del riego,** [Ecological control of irrigation], p. 113–119.

Revista Meteorológica, Montevideo, Volume 9, Number 35, October 1950.

Tiscornia, José: **La Meteorología agrícola debe interesar y pesar en las resoluciones de la IV Conferancia Interamericana de Agricultura,** [Agricultural meteorology should be of interest and figure in the resolutions of the IV Inter-American Conference on Agriculture], p. 123–129.
Lagarmilla, Roberto E.: **Sobre la coloración anormal del cielo y de los astros, observada periódicamente en Montevideo,** [On the abnormal color of the sky and stars, observed regularly at Montevideo], p. 130–150.
Bergeiro, Jose Maria: **La influencia marítima en el clima del Uruguay,** [Maritime influence on the climate of Uruguay], p. 151–168.

Royal Meteorological Society, Quarterly Journal, Volume 77, Number 333, July 1951.

Palmén, E.: **Symons Memorial Lecture: The rôle of atmospheric disturbances in the general circulation,** p. 337–354.
Craddock, J. M.: **The warming of arctic air masses over the eastern North Atlantic,** p. 355–364.
Burbidge, F. E.: **The modification of continental polar air over Hudson Bay,** p. 365–374.
Rider, N. E. and Robinson, G. D.: **A study of the transfer of heat and water vapour above a surface of short grass,** p. 375–401.
Ludlam, F. H.: **The production of showers by the coalescence of cloud droplets,** p. 402–417.
Best, A. C.: **Drop-size distribution in cloud and fog,** p. 418–426.

Kay, R. H.: **The apparent diurnal temperature variation in the lower stratosphere,** p. 427–434.
Sutcliffe, R. C.: **Mean upper contour patterns of the northern hemisphere—the thermal-synoptic view-point,** p. 435–440.
Frith, R.: **The size of cloud particles in stratocumulus cloud,** p. 441–444.
Bowen, E. G. and Davidson, K. A.: **A raindrop spectrograph,** p. 445–449.
Sheppard, P. A. and Elnesr, M. K.: **On the direct measurement of humidity mixing ratio and its fluctuations,** p. 450–453.

Correspondence

Glasspoole, J. and Hancock, D. S.: **Sunshine in the British Isles,** p. 454.
Goldie, A. H. R.: **Large-scale vortex motion in the atmosphere,** p. 455.
Fritz, S.: **Radiation in the troposphere and lower stratosphere,** p. 455–456.

Discussions

Sutcliffe, R. C., Sumner, E. J. and Bushby, F. H.: **Dynamical methods in synoptic meteorology,** p. 457–473.
Normand, Charles, Frith, R., Sawyer, J. S., Scrase, F. J. and Dobson, G. M. B.: **Recent work on the stratosphere,** p. 474–494.

Weather, Volume 6, Number 7, July 1951.

Paton, James: **Light and colour in the sky and landscape,** p. 195–199.
Bonacina, L. C. W.: **Turner as a weather painter, (A centenary appreciation),** p. 200–203.
Munn, R. E.: **Describing the skies,** p. 203–206.
Ovey, C. D.: **The anatomy of weather,** p. 210–212.
Gold, E.: **V. F. K. Bjerknes,** p. 216–217.

Weather, Volume 6, Number 8, August 1951.

Presentation of the Airmet Petition, p. 227.
Foster, L. B.: **A tourist's impression of Canada's North,** p. 228–232.
Henley, E. D.: **Weather and the carriage of freight by rail in Britain,** p. 233–236.
Brooks, C. E. P.: **Geological climates in the light of modern meteorology,** p. 237–241.
Readers' Forum, p. 241–242.
Geddes, Arthur: **Weather through the seasons on crag and peak, as sung in Gaelic songs,** p. 243–246.

Zeitschrift für Meteorologie, Volume 4, Number 10, October 1950.

Foitzik, Leonhard: **Zur meteorologischen Optik von Dunst und Nebel. Teil I,** [On the meteorological optics of haze and fog. Pt. I], p. 289–297.
Thraen, A.: **Zur Darstellung der Niederschlags-Jahresperiode. Als Beispiele: 7 Regen-Kerntypen aus Europa (Normalzeit: 1856–1944),** [On the presentation of the annual period of rainfall. As example: 7 characteristic rainfall types from Europe (normal period: 1856–1944)], p. 297–299.
Koch, H. G.: **Tagesperiodische Winde in Oberitalien,** [Daily periodic winds in Upper Italy], p. 299–313.
Bolz, H. M. and Fritz, H.: **Tabellen und Diagramme zur Berechnung der Gegenstrahlung und Ausstrahlung,** [Tables and diagrams for calculating counter-radiation and out-radiation], p. 314–317.
Pelzl, E.: **Nachruf auf** [Obituary of] **Dr. Loni Kassner,** p. 320.

Zeitschrift für Meteorologie, Volume 5, Number 3, March 1951.

Faust, Heinrich: **Eine einfache Methode aur Bestimmung der Verdunstungslabilität,** [A simple method of determining evaporation lability], p. 66–68.
Foitzik, L.: **Zur Verschlüsselung der Sichtweite nach dem neuen Sichtschlüssel VV,** [On coding visibility according to the new visibility code VV], p. 68–71.
Morgen, A.: **Ozonometrie im meteorologischen Dienst,** [Ozonometry in the meteorological service], p. 71–73.
John, Horst: **Dynamische Betrachtungen über einen Kaltlufttropfen,** [Dynamic considerations on a cold air bubble], p. 73–77.
Vilkner, H.: **Wolkenstrassen,** [Cloud lanes], p. 78–82.
Gelbke, W.: **Bemerkungen zum Phänomen der blauen Sonne,** [Remarks on the phenomenon of the blue sun], p. 82–84.
Jenne, W.: **Weitere Beiträge zur Beobachtung und Erklärung des Phänomens "Blaue Sonne,"** [Further contributions to the observation and explanation of the phenomenon "blue sun"], p. 84–86.

Dietze, Gerhard: **Die anormale Trübung der Atmosphäre September/October 1950,** [The abnormal turbidity of the atmosphere Sept./Oct. 1950], p. 86–87.

Zeitschrift für Meteorologie, Volume 5, Number 4, April 1951.

Hollmann, Günther: **Über die Instabilität planetarischer Wellen und ihre Bedeutung für die Entstehung stationärer Druckgebilde,** [On the instability of planetary waves and their importance for the development of stationary pressure formations], p. 97–101.

Viete, G.: **Zum Klima der Vorzeit,** [On the climate of the past], p. 102–110.

Voigts, Heinrich: **Gang der Jahresmitteltemperaturen und Sonnenfleckenzyklus,** [Variation of mean annual temperature and sunspot cycle], p. 110–116.

Kretschmer, E.: **Erfahrungen mit einem lugtbeheizten Böen- und Windrichtungsschreiber auf dem Fichtelberg,** [Experiences with an air-heated gust and wind direction recorder on the Fichtelberg], p. 116–120.

Gäbler, Horst: **St.-Elmsfeuer-Beobachtung,** [Observation of St. Elmo's Fire], p. 124.

Zeitschrift für Meteorologie, Volume 5, Numbers 5–6, May–June 1951.

Veröffentlichungen von Reinhard Süring, [Publications by R. Süring], p. 129–133.

Keil, Karl: **Streiflichter auf die Entwicklung der Meteorologie zu Lebzeiten R. Sürings,** [Sidelights on the development of meteorology during the life-time of R. Süring], p. 133–135.

Georgi, J.: **Bemerkung zur Solarkonstanten,** [Remark on the solar constant], p. 136–139.

Haude, Waldemar: **Zur Bestimmung der Verdunstung mit Hilfe von im Boden eingesetzten Töpfen,** [On the determination of evaporation with the help of pots set in the ground], p. 139–143.

Robitzsch, M.: **Eine einfache Auflösungsmethode für die Psychrometerformel,** [A simple method of solving the psychrometer formula], p. 143–147.

Flohn, H.: **Zur vertikalen Verteilung des Wasserdampfes in der Atmosphäre,** [On the vertical distribution of water vapor in the atmosphere], p. 148–152.

Goldschmidt, Johannes: **Die Bestimmung des Niederschlagswassers der Atmosphäre aus Radiosondenaufstiegen und optischen Messungen,** [The determination of the precipitable water of the atmosphere from radiosonde ascents and optical measurements], p. 152–160.

Rossmann, F.: **Die Ausbildung der Föhnfischwolkenformen an oder über einem Gebirge,** [The formation of lenticular föhn clouds on or over a mountain], p. 160–163.

Kleinschmidt, E., Sen.: **Zum Tagesgang des Windes in Potsdam,** [On the diurnal variation of the wind in Potsdam], p. 163–167.

Raethjen, P.: **Bemerkungen zum Tangentialdruck des Windes am Erdboden,** [Remarks on the tangential pressure of the wind at the earth's surface], p. 167–170.

Frankenberger, E.: **Über Austauschmessungen,** [On Austausch measurements], p. 171–172.

Knoch, Karl: **Über das Wesen einer Landesklimaaufnahme,** [On the nature of a national climatic survey], p. 173–177.

Hoffmeister, J.: **Die Häufigkeit der Niederschläge nach Stufenwerten in Nordwestdeutschland,** [The frequency of precipitation by steps in northwest Germany], p. 178–183.

Schmauss, A.: **Randbemerkungen VIII,** [Comments VIII], p. 183–185.

Möller, F.: **Die Temperatur der Mondoberfläche,** [The temperature of the moon's surface], p. 185–189.

LIST OF PERIODICALS

Note: This list contains the titles of the periodicals which regularly contain material on meteorology or related fields and it comprises only a small percentage of the periodicals from which pertinent articles are abstracted.

In this list the preferred form of title entry is given in bold face type. If the title is distinctive, the name and headquarters of the issuing society or organizations follows the title. If the title is not distinctive (for instance, Bulletin, Journal, Trudy, Mitteilungen), the entry consists of the issuing body followed by the title.

PERIODICALS IN WHICH METEOROLOGICAL ARTICLES REGULARLY APPEAR

Académie des Sciences, Paris, Comptes Rendus.
Akademiia Nauk, SSSR, Izvestiia, Ser. Geogr. i Geofiz., [Moscow].
American Geophysical Union, Transactions, National Research Council, Washington.
★**American Meteorological Society, Bulletin,** [Boston].
★**Annalen der Meteorologie,** Meteorologisches Amt für Nordwestdeutschland, Hamburg.
Annali di Geofisica, Istituto Nazionale di Geofisica, [Rome].
★**Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A and Ser. B,** [Vienna].
Australian Journal of Scientific Research, Ser. A, Physical Sciences, [Melbourne].
Ciel et Terre, Société Belge d'Astronomie, de Météorologie et de Physique du Globe.
Geofisica Pura e Applicata, Istituto Geofisica Italiano, [Milan].
Geophysical Magazine, [Central Meteorological Observatory, Toyko].
Hemel en Dampkring, Nederlandse Vereniging voor Weer- en Sterrenkunde, [The Hague].
★**Időjárás,** Az Országos Meteorológiai és Földmágnességi Intézet, [Budapest].
★**Indian Journal of Meteorology and Geophysics,** [Delhi].
Journal of Atmospheric and Terrestrial Physics, [London].
Journal of Geophysical Research, [Washington].
★**Journal of Meteorology,** American Meteorological Society, [Boston].
★**Journal Scientifique de la Météorologie,** Société Météorologique de France, [Paris].
★**The Marine Observer,** Air Ministry, Meteorological Office, London.
★**The Meteorological Magazine,** Air Ministry, Meteorological Office, London.
★**Meteorological Society of Japan, Journal,** Second Series, Kisho Shushi, [Tokyo].
★**Meteorologické Zprávy,** Státní Meteorologický ústav v Praze, [Prague].
★**La Météorologie,** Société Météorologique de France, [Paris].
★**Meteorologische Rundschau,** [Bad-Kissingen]
Meteoros, [Buenos Aires].
★**Monthly Weather Review,** U. S. Weather Bureau, Washington, D. C.
Nature, [London].
★**Nimbus,** Sociedad Meteorológica de Bolivia, [La Paz].
Polarforschung, Archiv für Polarforschung in Kiel, [Kiel, British Zone, Germany].
★**Revista Meteorológica,** Junta Nacional de Meteorología, Montevideo.
★**Rivista di Meteorologia Aeronautica,** Associazione Culturale Aeronautica, [Rome]
★**Royal Meteorological Society, Quarterly Journal,** [London].
Royal Society of London, Proceedings, Ser. B.
★**Tellus,** Svenska Geofysiska Föreningen, Stockholm.
Vsesoiuznoe Geograficheskoe Obshchestvo, SSSR, Izvestiia, [Moscow-Leningrad].
★**Weather,** Royal Meteorological Society, [London].
★**Weather Development and Research Bulletin,** Australia, Meteorological Branch, [Melbourne].
★**Weatherwise,** Amateur Weathermen of America, Philadelphia.
★**Wetter und Leben,** Österreichische Gesellschaft für Meteorologie, [Vienna].
★**Zeitschrift für Meteorologie,** Meteorologisches Observatorium, [Potsdam].

★ Indicates those periodicals which are primarily meteorological.

TABLE OF CONTENTS

Meteorological Abstracts and Bibliography. Volume 2, Number 8, August 1951

Foreword iii
Explanations iv

PART I. ABSTRACTS OF CURRENT METEOROLOGICAL MATERIAL

General Meteorology 643
Meteorological Observations and Instruments 645
Observations 645
Instruments 646
Synoptic Analysis and Forecasting 649
Structure and Physics of the Atmosphere 650
Upper Atmosphere—Ionosphere 650
Mechanics and Thermodynamics of the Atmosphere 653
General Circulation 654
Atmospheric Disturbances 655
Radiation and Temperature 657
Radiation 657
Temperature 659
Atmospheric Pressure and Wind 660
Pressure 660
Wind Effects 661
Aqueous Vapor and Hydrometeors 662
Water Vapor and Clouds 662
Precipitation 664
Rain 665
Snow 666
Hydrometeorology 666
Climatology and Bioclimatology 668
Climatology 668
Microclimatology 669
Climatic Classification 670
Bioclimatology 671
Upper Air and Synoptic Climatology 673
Miscellaneous Applications 674
Optical Phenomena 674
Atmospheric Electricity 674
Cosmic Phenomena 677
Oceanography 678

PART II. SELECTIVE ANNOTATED BIBLIOGRAPHY ON RADAR AS APPLIED TO METEOROLOGY

Subject Outline 680
Bibliography on Radar as Applied to Meteorology 681
Supplementary Material 710

PART III. METEOROLOGICAL ARTICLES APPEARING IN RECENTLY ISSUED PUBLICATIONS 712

PART IV. AUTHOR AND SUBJECT INDEXES

Index of Authors 721
Index of Subjects 725
Index of Geographical Locations 728

List of Periodicals ..... Cover 3